

## ABSTRACT

Title of Thesis:       RELATIONSHIP BETWEEN PROPERTIES OF PARENTAL  
CODE SWITCHING BEHAVIOR AND PARENT REPORT OF  
CHILDREN'S LEXICAL ACQUISITION

Amelie Bail, Master of Arts, 2013

Thesis directed by:   Professor Rochelle Newman  
Department of Hearing and Speech Sciences

This study investigated the code switching behavior of bilingual parents when speaking to their children, and the relationship between this code switching and children's vocabulary development. The speech of 18 bilingual Spanish-English parents was transcribed and analyzed, and the total Spanish-English vocabularies of their 18-24 month old children were calculated by parent report. All of the parents code switched at least once, and several parents code switched fairly often. Intra-sentential code switching occurred less often than inter-sentential code switching; however, only the former had a significant, positive relationship with vocabulary. Intra-sentential code switching also positively related to translation equivalents in children's vocabularies. Code switching, in general, did not seem to be harmful to children's lexical development. Other factors possibly contributing to the results, along with directions for future research, are discussed.

RELATIONSHIP BETWEEN PROPERTIES OF PARENTAL CODE SWITCHING  
BEHAVIOR AND PARENT REPORT OF CHILDREN'S LEXICAL ACQUISITION

by

Amelie Bail

Thesis submitted to the faculty of the graduate school of the  
University of Maryland, College Park in partial fulfillment  
of the requirements for the degree of  
Master of Arts  
2013

Advisory Committee:

Professor Rochelle Newman, Chair  
Professor Nan Bernstein Ratner  
Assistant Professor Yi Ting Huang

© Copyright by

Amelie Bail

2013

## TABLE OF CONTENTS

List Tables .....	iii
List of Figures .....	iv
Theoretical Rationale .....	1
Patterns of CS in Adult Speakers .....	3
Theories of CS .....	5
Effect of CS on the Listener .....	7
Influence of Parental Input on Young Children’s Lexical Development .....	9
Parental CS in Speech to Young Bilingual Children .....	12
The Present Study and Research Questions .....	17
Method .....	18
Participants .....	18
Materials .....	18
Stimuli .....	20
Procedure .....	21
Coding & Analysis .....	22
Statistical Analyses .....	25
Inter-Rater Reliability .....	25
Results .....	26
Coding Schema .....	26
Descriptive Statistics Overview .....	29
Hypothesis One .....	32
Observed CS .....	32
Reported CS .....	40
Hypothesis Two .....	42
Hypothesis Three .....	43
Discussion .....	46
Limitations .....	58
Coding Decisions and Their Implications .....	59
Future Research .....	62
Conclusions .....	64
Appendix .....	71
References .....	80

## LIST OF TABLES

1.	Language Sample with English ML and Spanish EL	28
2.	Correlations Between Observed CS & Measures of Vocabulary	34
3.	Summary of Stepwise Regression Analyses with Predictor Variables TRA & Age	35
4.	Summary of Stepwise Regression Analyses with Predictor Variables TER & Age	35
5.	Summary of Stepwise Regression Analyses with Predictor Variables LSW & Age	36
6.	Demographic Data Related to Parental Fluency	39
7.	Correlations Between Reported CS & Measures of Vocabulary	41

## LIST OF FIGURES

1.	Children's Average Vocabulary Totals	30
2.	Correlation Between Number of Intra-sentential CS and Total Vocabulary (TV) Minus Cognates	65
3.	Correlation Between Number of Intra-sentential CS and Total Vocabulary	65
4.	Correlation Between Number of Intra-sentential CS and Total Conceptual Vocabulary	66
5.	Correlation Between Proportion of Intra-sentential CS and Total Vocabulary (TV) Minus Cognates	66
6.	Correlation Between Proportion of Intra-sentential CS and Total Vocabulary	67
7.	Correlation Between Proportion of Intra-sentential CS and Total Conceptual Vocabulary	67
8.	Stepwise Regression for Total Vocabulary (TV) Minus Cognates with Intra-sentential CS & Age as Predictor Variables	68
9.	Stepwise Regression for Total Vocabulary (TV) with Intra-sentential CS & Age as Predictor Variables	68
10.	Stepwise Regression for Total Conceptual Vocabulary (TV) with Intra-sentential CS & Age as Predictor Variables	69
11.	Correlation Between Intra-sentential CS and Translation Equivalents (TEs)	69
12.	Correlation Between Intra-sentential CS and Translation Equivalents (TEs) Excluding Cognates	70

## **Relationship between properties of parental code switching behavior and parent report of children's lexical acquisition**

Many children grow up bilingual, learning two languages simultaneously. These bilingual children receive language input from their parents that may differ from that of monolinguals in several ways. The most obvious difference is that bilingual children receive input in more than one language; but what may be equally important is that this input may contain instances of the languages being “mixed” together. This “mixing” of more than one language while speaking is referred to as code switching (CS).

Bilingual speakers can code switch in multiple ways, to varying degrees, and for different reasons. Most research describes and analyzes code switching in the context of adult-adult speech or speech between an adult and a school-aged child. Little research has examined CS in adults’ speech to young children. Still less has examined the effect code switching might have on the child’s language acquisition (e.g., Byers-Heinlein, 2012; Place & Hoff, 2011).

Adults might, to some degree, avoid code switching with young children, for fear of causing linguistic confusion or increasing processing demands. Code switching has been shown to create some degree of processing costs during laboratory tasks with adult bilinguals (e.g., Proverbio, Leoni & Zani, 2004; Abutalebi et al, 2007). Code switching would likely cause similar, if not greater processing costs to a young child. Another possibility is that adults may not completely avoid CS with children, but may do so to a different degree or in a different manner than with other adults. For instance, they may CS predominantly across sentences (inter-sentential CS), rather than within sentences, as the latter (intra-sentential CS) could be more challenging for the child to process, since it requires a rapid switch between lexicons within a single sentence (usually involving only one or a few words). Code switching inter-sententially

could possibly be less problematic, as it involves a language switch between sentence boundaries and is generally comprised of a longer string of words in the other language. Processing an entire utterance that has been switched to another language may present a smaller processing demand than having to make a rapid adjustment within a sentence.

It is very possible that aspects of CS may affect lexical development, especially in the case of a young child in the process of learning language. We would expect that it may be easier to learn language when there is no CS in the input, because there are no potential disruptions caused by switching languages and no additional processing costs to the listener (e.g. Proverbio et al., 2004; Abutalebi et al, 2007). If CS is challenging for young language learners to process, children who are frequently exposed to CS may be at a relative disadvantage in terms of their vocabulary development. These children may be less advanced in their lexical development than children who are not exposed to CS or who are exposed to CS less frequently.

If there is no difference in lexical development as a function of CS, this could indicate that CS is not detrimental to language development. In some cases, certain types of CS may even facilitate word learning. Particularly if parents CS to translate a word, this may help children to develop translation equivalents (TEs), which would contribute to a larger vocabulary. Thus, there are two alternative hypotheses: CS might be detrimental to language learning as a result of increased processing demands. Alternatively, it might aid language development through the explicit teaching of translation equivalents. Little research distinguishes between these alternatives, yet they would have vastly different implications for parents and educators working with young children.

The current research analyzes bilingual parents' speech to their young children, along with their children's expressive vocabulary, in order to examine the relationship between CS and lexical development. Several different topics will be discussed in order to support the need for this study:

- Patterns of CS in Adult Speakers
- Theories of CS
- Effect of CS on the Listener
- Influence of Parental Input on Young Children's Lexical Development
- Parental CS in Speech to Young Bilingual Children

#### *Patterns of CS in Adult Speakers*

Code switching (CS) is a complex manipulation of two languages within a conversation that is common practice among many bilinguals, and often seems to occur seamlessly and without much effort. It is not a random mixing of languages, and does not indicate incompetent language use. Rather, CS is a phenomenon that is governed by grammatical constraints and generally reflects a more proficient level of linguistic competence. There are, of course, differences in the types of code switches used and the functions of code switching, and there is variability depending on the speaker's comfort and proficiency in each language (Milroy & Muysken, 1995; Isurin, Winford, & de Bot, 2009; Bullock & Toribio, 2009).

There are different ways a speaker may code switch: between sentences (inter-sententially) or within a sentence (intra-sententially), and one or multiple words may be switched. Any or all of these types of code switches may occur one time or several dozen times within a conversation. However, there are constraints on CS which relate to the grammar of the

languages being used, especially when the switch occurs within an utterance. A bilingual speaker may only CS at specific points that are considered grammatically appropriate according to the morpho-syntax of the languages (Muysken, 2000; Bullock & Toribio, 2009). Several theories have been developed to explain grammatical constraints on CS, which will be discussed in a subsequent section.

Code switching can manifest differently and can be used to satisfy various functions. Some CS may be volitional, motivated by pragmatic or semantic reasons, whereas other CS may be more non-volitional, related to difficulty accessing a concept. For example, speakers may CS when a particular concept is accessed more easily in the other language, due to frequency effects or word finding abilities. Volitional CS, on the other hand, may be motivated by many other factors. When there is no exact translation for an expression or the entire meaning is not effectively conveyed through translation, a speaker may choose to CS. This could be at the word level (e.g., “*cariño*,” which means a combination of love and care) or at the phrase level (e.g., “*tal para cual*,” which can be interpreted as “made for each other,” “two of a kind,” etc.). Similarly, code switching may be used to keep with the spirit of a quote (e.g., “And then he said, ‘*Cálmate chiquita!*’”). In other cases, CS may be related to social status or identity within a culture. For example, in New York, it is quite common for bilingual Puerto Ricans to CS frequently among themselves, displaying their ethnic identity and following the linguistic norms of their community (Poplack, 1981).

Some of the observed differences between the types and functions of CS used in conversation depend on the proficiency of the speaker and the perceived proficiency of the listener. Particularly for intra-sentential CS, the speaker must have adequate knowledge of each language’s grammar in order to switch easily and appropriately from one to the other (Meisel,

1994). The listener generally must share at least a comparable level of proficiency in order to interpret the code switched speech, and the speaker will usually infer this mutual proficiency before engaging in code switching (Poplack, 1981).

### *Theories of CS*

A large amount of research has been dedicated to describing and understanding code switching in adult speakers. Researchers from a variety of disciplines have studied CS and developed theories about the constraints on CS and what circumstances seem to promote or facilitate it (see Muysken, 2000; Cantone, 2007; Isurin, Winford & Bot, 2009 for detailed reviews of theories and studies). Each theory carries its own set of criticisms and there is debate in the literature over the application of the different theories. Two of the more prominent views of code switching can be distinguished by their focus on *insertion* versus *alternation* (Boumans, 1998).

From an insertional perspective, CS is thought of as the insertion or “embedding” of elements from one language into the syntactic frame of another language. Thus, in this view of CS, there is an asymmetrical relationship between the two languages. Myers-Scotton (1993, 1997) developed the model of a Matrix Language Frame (MLF), detailing the grammatical constraints on CS from this point of view. In this model, the base language, which provides the syntactic frame, is referred to as the Matrix Language (ML). The other language, which is thought of as a more secondary contributor, is referred to as the Embedded Language (EL). The ML and the EL are said to have unequal roles, such that elements from the EL are embedded into a “frame” that maintains the grammatical structure of the ML. In particular, mixed utterances maintain the word order, inflections, and the system morphemes (e.g., function words) of the

ML, and any insertions must maintain congruency with the element of the ML that would have otherwise been used (Boumans, 1998).

Under this model, single words, short phrases, or strings of phrases from the EL may be inserted, as long as they follow the constraints imposed by the ML. Basic clause structure is generally provided by the ML, except in the case of EL islands, which are embedded phrases (e.g., noun phrases, prepositional phrases, etc.) that do not follow ML word order or use ML inflections or system morphemes. However, these EL islands can only occur in positions that are allowed according to the overall surface order of the ML (Jake, Myers-Scotton & Gross, 2002). In the present study, code switching is analyzed primarily using an insertional approach, following Myers-Scotton's MLF model. The details of the analysis will be discussed in the Methods section.

From another perspective, CS is viewed as the act of switching back and forth between languages, with switches tending to occur between utterances or sentences. Rather than embedding one language into a base language, there is a complete switch from the grammar and lexicon of one language to the other. The key point is that neither language is thought of as being a secondary contributor (Poplack, 1980). Rather, the languages possess equal roles and a speaker can alternate between them at his or her discretion. Although, Poplack has proposed certain constraints related to where CS can occur. She and others also make a distinction between lexical borrowing and CS. Single word switches are not considered to be true CS, but instead are referred to as "nonce borrowings" (Poplack, Sankoff & Miller, 1988). In the present study language switches of any size, including single words switches, will be considered CS, following the MLF model (Myers-Scotton, 1993, 1997). However, an additional code will be used to mark the overall alternation, between sentences, from one language to the other and back.

In terms of encouraging or facilitating code switching, language mode can play a key role. When a bilingual speaker is interacting with a monolingual listener, the bilingual speaker is assumed to be in a monolingual language mode, with the second language being either inhibited or much less activated. However, when speaking with a fellow bilingual interlocutor, he or she may switch into a bilingual language mode, with more elevated levels of activation of the other language. This allows for words from both lexicons to be more easily accessed, which seems to promote code switching. In comparison, a monolingual mode tends to suppress code switching, which could explain why CS usually only occurs between bilingual interlocutors (Grosjean, 1995, 2001).

It is possible that day to day, some parents may interact with other bilingual speakers more or less frequently than others. Therefore, some parents may be in a bilingual mode more or less often, which may also contribute to their use of CS, in general, and perhaps with their children. This potentially could be a third variable related to CS, which we were not able to account for in this study. However, in the present study, parents were encouraged to enter a bilingual language mode, enabling them to code switch freely.

#### *Effect of CS on the Listener*

Although code switching generally appears to be produced effortlessly by the speaker and understood easily by the listener, this is not to say that it occurs without some processing cost to the listener. The literature is incomplete, but evidence from behavioral and event-related potential (ERP) studies has revealed differences in processing, such as increased response latencies, associated with code switching during simple language tasks (see Moreno, Rodriguez-Fornells & Laine, 2008 for a review of bilingual language processing studies).

Proverbio et al. (2004) assessed language-switching costs in a group of Italian-English interpreters. Participants made judgments about the semantic congruence of visually presented sentences by pressing a button. Sentences were either unmixed (Italian and English) or involved a code switch of the final word (Italian-mixed and English-mixed). Increased response times were found for mixed sentences when the switch was from the more dominant (L1) to the less dominant language (L2). ERP recordings reflected the same pattern of switch costs. A similar result was found using an event-related functional magnetic resonance imaging (er-fMRI) study where bilinguals listened to narratives (in both languages) containing code switches. Processing costs were detected following switches from participants' L1 to L2 (Abutalebi et al, 2007).

In a study by Chauncey, Grainger and Holcomb (2008), a group of bilingual participants pressed a button to indicate whether or not a visually presented word belonged to a given semantic category. For each trial, the target word was preceded by a masked prime word, which was either in the same or different language as the target word. Analysis of the participants' ERP recordings revealed language-switching costs when the target word was in a different language from the prime word. Switch costs were found for both directions of language switches (L1 to L2 and vice versa). In a similar type of masked priming study, symmetrical language-switch costs were observed in a group of balanced bilinguals (Duñabeitia, Dimitropoulou, Uribe-Etxebarria & Carreiras, 2010).

One explanation for processing costs as a result of code switching is that, initially, one language is being more strongly activated, so that when a switch occurs the listener must first recognize that the other language is being used and then increase activation of that language (Grosjean, 1995). Switching costs have also been attributed to the act of suppressing the currently activated language and reactivating the other language, which was previously being

inhibited or much less activated (Meuter, 2009). Differences between switch costs, that are associated with language dominance, may be related to cognitive control, needing to more strongly activate the L2 (Abutalebi et al., 2007), and a stronger activation input being provided from the L1 to language nodes (Chauncey et al., 2008).

Much of the research investigating processing costs due to code switching assesses bilinguals using a visual modality; however, naturally occurring CS is normally perceived through the auditory modality. This variation in test modality could result in greater apparent switch costs during laboratory studies, since the bilingual cannot make use of prelexical cues such as language-specific phonemes (Chauncey, Grainger & Holcomb, 2008).

Although the existing evidence comes from laboratory studies that do not accurately represent the social contexts in which CS normally occurs, it is expected that these findings would be applicable to real life scenarios. If the presence of code switching can lead to processing delays in simple, controlled language tasks, it would likely create similar effects during conversation. Given that CS presents processing costs to the adult listener, it is reasonable to assume that young listeners would likewise experience processing costs when listening to CS. Particularly in the case of toddlers, one would expect CS to create an even greater processing load, as toddlers have fewer resources available to use since they are still learning each language. This increase in processing load, caused by the presence of CS in the input, could potentially be confusing or challenging for the child and have an effect on lexical development.

### *Influence of Parental Input on Young Children's Lexical Development*

When young children are developing language, the input they receive is critical to their lexical acquisition. Much research has been dedicated to analyzing the type of input young

children are receiving, and attempting to determine what specific characteristics of parents' speech to children have a strong relation to language development. For instance, studies have shown that parents tend to use a slow rate of speech, emphasize content words, provide frequent repetitions, and use non-verbal cues such as pointing and gesturing when interacting with their children (Fernald, 1992; Gleitman, Newport, & Gleitman, 1984; Gleason, 1977; Snow, 1994). However, it is unclear exactly how or why these particular aspects of parents' speech may influence language development. Yet, certain elements have been shown to bolster lexical acquisition (Clark, 2003).

In particular, repetition seems to be a key factor in vocabulary development. In a laboratory training study with a group of one-year-old children, Schwartz and Terrell (1983) showed that words that were presented more frequently were learned more successfully than words that were presented less frequently. Similarly, Goodman, Dale and Li (2008) found a positive correlation between input frequency and lexical acquisition; however they used a naturalistic measure of parental input and a parent-report vocabulary measure. Transcripts from the CHILDES database provided estimates of the frequency with which parents used a subset of words from the MacArthur-Bates Communicative Development Inventory (MCDI) language questionnaire, and the MCDI norming database was used to derive estimates of the age of acquisition of the words. The authors found that within lexical categories, words which were produced with higher frequency were acquired earlier by children, as part of their productive vocabulary.

Vosoughi, Roy, Frank and Roy (2010) investigated the role of frequency, along with five other variables, in relation to a child's vocabulary development between the ages of 9-24 months. Cameras and microphones were set up throughout the child's home, in order to capture audio and video recordings of caregiver and child speech over the course of the longitudinal study. A

subset of these recordings (72 days, with an average of 9.6 hours per day) were transcribed and used for analysis. Recurrence was found to be one of the most highly correlated variables with the child's age of acquisition of a new word. Recurrence was related to frequency; however, it specifically referred to the repetition of a word within a short period of time (approximately one minute). There were also differences in the strength of each predictor depending on the word's syntactic class. Frequency was the strongest predictor for nouns, but not for other types of words. Recurrence was the strongest predictor for verbs and closed-class words. Thus, it seems that for children in the early stages of lexical acquisition, repetition, in general, is an important factor in bolstering vocabulary growth. When parents provide repeated exposure to new words, this seems to aid in the storing of and access to words (Hoff & Naigles, 2002).

Along the same lines, the amount of language input overall has been shown to strongly relate to vocabulary development. Several studies have found that children who receive larger amounts of input from their caregivers develop larger, more diverse vocabularies than children who receive more limited input (Hoff & Naigles, 2002; Huttenlocher, Haight, Bryk, Seltzer & Lyons, 1991). In these studies, the amount of language input was measured by the total number of words used. Hoff and Naigles (2002) also found that lexical richness was positively correlated with children's vocabulary, and that the number of words and variety of types of words were highly correlated. It appears that parents who use a larger number of words also tend to use a more diverse vocabulary (Hart & Risley, 1995; Weizman & Snow, 2001).

Presumably, in general, the aforementioned patterns in parents' speech to young children will hold for bilinguals. What parents do when speaking to their children will have an effect on their children's vocabulary. However, there are added variables when considering bilingual parents' speech to their children, such as parents' ability to either communicate in one language or to

incorporate both languages. If parents regularly use both languages when interacting with their children, there may be the possibility for code switching to occur. Whether parents choose to CS with their child and how they choose to CS could matter, and may have an impact on vocabulary development. This topic will be discussed in the following section.

### *Parental CS in Speech to Young Bilingual Children*

There is wide variation in the type of linguistic input that parents provide to their young bilingual children. Some parents attempt to adhere to the one-parent-one-language strategy (e.g., Genesee, Nicoladis, & Paradis, 1995), others use a mixed type of input where one or both parents speak in both languages, and some parents teach only the minority language to their children because they expect the majority language to be learned in the community (e.g., Fantini, 1985; Deuchar & Quay, 2000). If parents are providing mixed language input to their children, this opens up the possibility of code switching, but there is little research exploring how often this occurs. One recent study, in which CS was measured through a self-report Language Mixing Scale, found that CS (when speaking with young children) was fairly common in a sample of over one hundred bilingual parents (Byers-Heinlein, 2012). Still, there was a subset of participants who reported little to no language mixing, which may represent a percentage of parents who are following a one-parent-one-language strategy.

If parents are code switching when speaking with young children, it may be different from the way they CS when communicating with other adults. Parents may choose to CS only between sentences, only within sentences, or with only one word at a given time. Different types of code switches may be processed more or less easily by young children and may have varying effects on vocabulary development, if any.

One possibility is that code switching, in general, is more difficult for children to process than speech that involves only one language. If this were the case, code switching could have a negative relationship with vocabulary development. Another possibility is that one type of CS (inter-sentential or intra-sentential) may be more strongly related to vocabulary than another, or one type may have a relationship with vocabulary, while another type may not. Perhaps one type of CS could be negatively related to vocabulary, while another type could be positively related, depending on the function of CS.

It is likely that the function of CS when speaking to young children differs from that of adult-adult CS. For example, parents may CS with children to teach a translation (e.g., Byers-Heinlein, 2012) or get the child's attention. Parents may also CS words that are difficult for the child to pronounce, or words that the child is more familiar with in one language. If this were the case, some CS could potentially facilitate learning. This possibility will be discussed later.

If, overall, CS presents a processing challenge for young children, it is possible that intra-sentential CS could present particular complications, in terms of word learning. With an intra-sentential CS, two languages are presented within a single sentence. This may be an especially difficult context from which to learn a new word, as it may be harder to identify the language of the target word. In a word-learning study, Fennell, Byers-Heinlein and Werker (2007) found that bilingual 17 month-old infants were unable to learn minimal pairs when the words were presented in isolation. However, bilingual infants of the same age were able to learn minimal pairs when presented within the context of a single-language sentence (Fennell & Byers-Heinlein, 2011). The authors suggest that the infants may have been able to encode and retrieve the words more successfully when they were taught within a sentence context, as the additional speech may have facilitated the identification of the language being used.

There was no comparison made between word-learning from a single-language versus a mixed-language sentence, but the latter may be a more difficult task. This would depend on what it was about the sentence that helped the infants. If it was something acoustic (such as having a speaking rate standard) then it might be just as helpful to have the sentence, even if it were in another language (i.e., a mixed-sentence). On the other hand, if the sentence context helped the infants to identify the language of the target word, a single-language sentence would be more helpful than a mixed-language sentence.

While inter-sentential CS also involves a switch in languages, this switch is separated by the sentence boundary. Although there is a change in language, the entire CS sentence is still a single-language sentence (e.g., “¡Mira este juguete! *It's a fish!*”). In a word learning scenario, this type of CS may be easier to manage than intra-sentential CS, as it would be more similar to the single-language context in Fennell and Byers-Heinlein's study.

Code switching, in general, may complicate word learning for young children. Therefore, if parents frequently code switch, children's lexical acquisition could potentially be negatively impacted. Byers-Heinlein (2012) found a negative correlation between parental CS and 24 month-old children's productive English vocabularies, as well as a marginally significant negative correlation between parental CS and 18 month-old children's receptive English vocabularies. Inter-sentential versus intra-sentential CS were not differentiated, as code switching was measured using a total score derived from parent-report ratings of CS. Nonetheless, code switching, on the whole, had a negative relationship with young children's lexical development.

Other studies have included mention of vocabulary development and code switching, but have not found significant relationships between these two variables. Place and Hoff (2011) examined 29 bilingual children's daily exposure to Spanish and English and investigated how their language exposure related to language acquisition. Parents kept diaries, dividing each day into 30-minute blocks, where they recorded (in each block) whether their child heard only English, only Spanish, or both languages. Mixed blocks could consist of either two different speakers addressing the child (each in a different language) or one person addressing the child in both languages (i.e. code switching).

Exposure to English-only and Spanish-only blocks was found to have a positive relationship with English and Spanish vocabulary, respectively. However, exposure to mixed blocks showed no significant relationship with lexical development. In this study, code switching was not quantified, but rather estimated very generally throughout the day, and mixed blocks did not represent code switched speech exclusively. There was enough sensitivity in this study to detect non-CS effects, but likely not enough sensitivity to detect CS effects. CS was not measured directly, and was estimated by the number of 30-minute blocks of language mixing. The percentage of CS within the 30-minute blocks, or some other more sensitive measure, may be necessary to see effects of CS for lexical development. David and Wei (2008) did quantify the observed amount of intra-sentential CS in the speech of bilingual parents to their young children, using transcribed speech samples, but did not report any correlations between CS and children's vocabulary (as this relationship was not the focus of the study).

The present study will investigate how often bilingual parents code switch when interacting with their young children and whether the amount of CS relates to the size of children's productive vocabularies. It is possible that children may hear more or less CS, in general, if they

are also exposed to adult-adult CS (e.g. if the parents CS when speaking to each other or with other family members). However, the focus of this study will be on CS directed toward the child. Code switching will be evaluated through direct observation and will be quantified separately for intra-sentential and inter-sentential CS. Children's vocabularies will be quantified by combining Spanish and English productive vocabularies, as measured by parent report.

A final topic to be addressed by the present study is children's acquisition of translation equivalents (TEs: cross-language synonyms). If bilingual parents are communicating with their children in both languages, another possibility is that they could be promoting the development of TEs, which would contribute to a larger total vocabulary (Spanish and English combined). With children, adults may be more likely to provide TEs, saying a word in one language and then repeating it in the other language in an adjacent utterance. Adults do not need to do this when conversing with another adult, unless they choose to do so for emphasis, or if the listener indicates that they did not understand something.

However, this might be logical to do with children. Parents typically repeat to children, particularly when teaching new words (i.e. concrete nouns). As bilingual parents have the option to provide labels in either language, they may repeat the same word in an adjacent utterance (using the other language), in order to present the child with multiple labels for the same concept. This behavior may help children to develop translation equivalents in their vocabularies. Thus, this type of CS could be beneficial to lexical acquisition.

In a longitudinal study of 13 French-English bilingual children (12-36 months of age), David and Wei (2008) found a significant correlation between language exposure and translation equivalents. Children with more balanced language exposure tended to have more TEs in their

vocabulary. Language exposure was calculated as a percentage, based on parent report, and TEs were quantified by comparing MCDIs in French and English. Parents' speech was also analyzed using recordings of parent-child interactions. Intra-sentential code switching was calculated (as a proportion to total utterances); however no significant relationship was found between CS and translation equivalents. David and Wei only examined intra-sentential CS as a language switching behavior potentially related to TE development. Instances of translations in adjacent utterances were not calculated.

In Byers-Heinlein's (2012) study, parents reported switching languages when teaching new words, but there was no mention as to whether this involved repeating the word in both languages. The present study will look specifically at translations in adjacent utterances, examining how often this occurs in parents' speech to their children, and whether or not this has a positive relationship with translation equivalents in children's vocabularies. If this is a common behavior for parents, CS may positively relate to lexical development.

### *The Present Study*

The present study examines the code switching behavior of parents when interacting with their children during an unstructured play session, and the relationship between this CS and children's lexical acquisition. More specifically, the current study addresses the following questions:

- (i) Does the amount of code switching present in parents' speech to their children correlate with children's vocabulary? Does a greater amount of CS correspond to a smaller vocabulary?
- (ii) Supposing that code switching does affect lexical development, does the amount of intra-sentential CS versus inter-sentential CS differentially affect vocabulary?

(iii) Do parents CS to repeat the same word in the other language (e.g., “Look at the dog! *El perro!*”)? If so, how often does this occur and does this have an implication for vocabulary development? Specifically, does this result in more translation equivalents (TEs), and thus a larger total vocabulary?

## **Method**

### *Participants*

The participants were 18 caregiver-child dyads. The children were between 18 and 24 months of age (9 males;  $M= 20.6$  months,  $SD= 4.35$ ). Each child was exposed to both English and Spanish from one or more of their caregivers. The caregiver of interest for this study was the Spanish-English bilingual who spent the most time interacting with the child, which was the mother in all but one case. All of the children experienced a total of at least 30% exposure to each of the two languages and had not been previously diagnosed with any developmental problems. The participants were recruited through the University of Maryland infant database. Children were given a small prize for participating in the study.

### *Materials*

Two parent-report language questionnaires were used to measure child vocabulary: the MacArthur-Bates Communicative Development Inventory (MCDI) and the Spanish-adapted version, the MacArthur-Bates Inventarios del Desarrollo de Habilidades Comunicativas (Jackson-Maldonado et al., 2003). There is a great deal of evidence demonstrating the MCDI’s validity and reliability (Fenson et al., 1991), and it has been shown to be an effective parent-report tool for vocabulary measurement because it requires parents to recognize words that they have heard their child say (from an inventory of words), rather than recall them from memory (Hurtado, Marchman & Fernald, 2007). The combination of Spanish and English MCDIs has

been used successfully with reliable results in several studies that examined bilingual children's language development (e.g., Pearson et al., 1993, 1997; Pearson & Fernandez, 1994, David & Wei, 2008). One limitation of these parent-report questionnaires is that they are inventories of words, rather than an exhaustive list, and thus they do not represent the child's entire vocabulary (Pearson, Fernandez & Oller, 1993; Pearson, 1998). Nevertheless, the MCDI is a useful tool, as it allows for the creation of a composite measure of vocabulary, which is more representative of the bilingual child's lexical development than a single measure of vocabulary in either language separately (Pearson, Fernandez & Oller, 1993; Pearson, 1998).

A language history questionnaire was also used to gather information about the language background of the parents, as well as the input provided to the child (see Appendix A). The language history questionnaire was comprised of questions adapted from questionnaires by Bosch & Sebastian-Galles (1997) and Byers-Heinlein (2009), and was written in both Spanish and English. Some questions asked for estimates of parents' proficiency in each language using an ordinal scale from 1-7 (1= little or no knowledge, 7= like a native speaker) and how and when they learned Spanish and English. Parents were also asked to provide an estimate of the amount of time they spoke with their child in Spanish and in English each day. Other questions asked about the type of input the child was receiving from other people in his or her life and how often he or she was exposed to Spanish and English.

Some final questions pertained to parents' use of code switching when interacting with their children. Parents were asked to rate the truthfulness of five statements, including "I often start a sentence in English and then switch to Spanish" and "I often borrow a word from English when speaking in Spanish" and vice versa. A final question asked if "In general, I often mix

Spanish and English.” A rating scale from 1-7 was used to answer these questions (1= very true, 7= not at all true). These ratings were used as a measure of reported CS.

### *Stimuli*

The participants were provided with a selection of 25 toys to play with during the play session. The toys included animals (horse, snake, octopus, fish, shark, butterfly, bears, dogs, cat, lobster, rabbit, cow, pig) food items (hot dog, orange, corn, egg), a Mrs. Potato Head doll (with removable eyes/nose, mouth, arms, shoes, and hat), and other items that were expected to be somewhat familiar to the children (hairbrush, two pairs of star-shaped sunglasses, a small plane with wheels, and a plastic dog bowl). The items selected are not cognates in English and Spanish, as this could make it difficult to determine which language was being used when the caregiver was naming the objects.

After the play session, some of the caregivers were asked whether they normally used only one language to name any of the items seen in the toy assortment, and whether this occurred only when speaking with their child, or whether they tended to use that the word in that language when speaking with adults as well. This was to get an idea of whether parents knew the name of every item in both languages, or whether some code switching occurred because of a lexical gap. Some parents reported a preference for saying the word in one language over the other, but it was difficult to be certain that parents definitely knew the translation of every word, as it seemed uncomfortable to admit that.

Some parents explained that they said certain words in only Spanish or English with their child because either the child always said the word in that language, or the child was more familiar with the word in that language. These kinds of behaviors could potentially be helpful to

language development, since the discourse functions of CS would be to facilitate comprehension. One mother, during the play session, translated almost every item that she named while interacting with her child. For one of the two items she didn't translate, she explained that she tended to use "octopus" instead of the Spanish word "pulpo" because her child was more familiar with the English word from a television cartoon he watched, called "Octonauts." For the other item, she explained that she tended to use the word "peas" with her child, in order to maintain consistency, because the Spanish equivalent she used was "arbejas", whereas her mother-in-law used the equivalent "guisantes". Reasons such as these were common explanations given by parents.

### *Procedure*

Prior to the study, parents were mailed the Spanish and English MCDIs and the language history questionnaire, along with instructions in both Spanish and English. Parents were asked to fill out the questionnaires before coming in, and were specifically instructed to mark only words that they had heard their child say in that particular language on each MCDI form.

When parents arrived for the study, questionnaires were collected and a bilingual researcher explained that they would be playing with their child with an assortment of toys for 10-15 minutes, and would be audio-recorded. When explaining the study, the researcher spoke primarily in either English or Spanish, depending on the parent's preference. However, the researcher also spoke briefly in the other language to make it clear that it was a bilingual setting and parents were free to treat it as such. Parents were asked whether they typically spoke in English, Spanish, or both languages with their child. However, code switching was not directly

mentioned as a topic of interest to the study. Parents were told that this study was looking at the input that bilingual children are receiving.

Parents were led to a room with an assortment of toys and were instructed to play with their child as they would at home and speak as they would normally in either language.

Parents were given an Audio Technica lavalier microphone to clip to their clothing, and the session was audio-recorded as an uncompressed WAV file using a Marantz PMD660

Professional Portable Digital Recorder at a sampling rate of 44.1 kHz. Speech samples of the parents were taken from these recordings. During their visit, children were also tested for an unrelated study, not described here.

#### *Coding & Analysis*

Spanish and English MCDI scores were used to quantify children's vocabulary. Two vocabulary counts were calculated: total vocabulary (TV: total number of words known in Spanish and English combined) and total conceptual vocabulary (TCV: total vocabulary minus overlapping vocabulary, which reflects the total number of concepts for which the child has at least one word). If a child had a large number of translation equivalents in his or her vocabulary (e.g., perro and dog), the TCV total was smaller than the TV total, as the TCV total counts these "doublets" only once. Additionally, a third total was calculated to account for cognates words, as they could inflate the child's apparent vocabulary. Many parents had marked cognate words (e.g. tren & train) on both the Spanish and English forms. However, it was nearly impossible to discern whether the children truly possessed separate lexical representations for these cognate words. Thus, cognates were removed from the TV count (TV-cognates). These three vocabulary totals were used in correlational analyses with the amount of code switching in parents' speech.

The number of translation equivalents (TE) were calculated by counting the number of “doublets” in the child’s vocabulary, where the child had two lexical items, one in each language, for the same concept (e.g., dog and perro). A proportion of TEs to vocabulary was also calculated, and both TE counts were used in correlational analyses with the number of the times the caregiver translated a word in an adjacent utterance.

The five questions on the language history questionnaire pertaining to the caregivers’ use of code switching were used as a measure of self-reported amount of code switching. The ratings from each question were correlated with each vocabulary count. An average of the five scores was also calculated and used in correlational analyses.

The amount of observed code switching was calculated using parents’ speech samples from the unstructured play sessions. The audio recordings of the play sessions were uploaded to a computer and orthographically transcribed using the Computerized Language Analysis (CLAN) program developed by the CHILDES project (MacWhinney, 2007). The CLAN program was used to link sound files directly to transcripts in small “bullet” segments in order to facilitate accurate transcription. Utterances boundaries were determined using two of three criteria: after pauses longer than one second, after a terminal contour (drop in pitch), and/or after an obvious grammatical structure ending. After orthographic transcription was completed, these bullets were coded using Codes for the Human Analysis of Transcripts (CHAT), which allows for a variety of analyses using different tiers for each parameter of interest (MacWhinney, 2000).

Coding and transcription procedures were followed according to the CHAT manual (MacWhinney, 2007), along with additional coding conventions particular to this study. Each utterance was precoded as follows, in order to indicate which language was used: [-eng] for English, [-spa] for Spanish, [-mix] for utterances where both Spanish and English words were

used, and [-una] for utterances that were unassigned to a language, given that they were unintelligible or only consisted of sound effects (e.g. [=! chewing noises]). If the speaker said only one word in an utterance, which could be from either language (e.g., "no"), these instances were precoded in one of two ways. If the utterances immediately before and after were in the same language, the ambiguous utterance was coded in that language (e.g., "You want some food? No? Why not?": all precoded as [- eng]). However, if there were two different languages preceding and following, the ambiguous utterance was marked as unassigned ([- una]).

Code switches were marked on a dependent tier (%csw), which was added beneath the main transcription line. Following the MLF model, the insertion of a single word or phrase from the EL into the ML was marked as TRA (intra-sentential CS). Proper names (e.g., Mamá, Mrs. Potato Head, etc.) and words in the other language that functioned as a proper name (e.g. "Tía," used as the name of an aunt) were not considered CS. Switches from the ML to EL between sentence boundaries (inter-sentential CS) and consecutive EL utterances were marked as TER. An additional code (LSW) was used to mark the overall language alternation between sentences, from the ML to EL and back. This LSW total was used as an additional measure of inter-sentential CS, denoting the alternations between languages. The `FREQ` command (frequency count) was used to calculate the total number of each type of CS (`freq +t%csw +sTRA`; `freq +t%csw +sTER`; `freq +t%csw +sLSW`) (MacWhinney, 2007). The percentage of intra-sentential and inter-sentential CS relative to the total number of utterances was also calculated. Unassigned utterances were not included in the total utterance count.

Another code on the dependent tier, AJT, was used to mark when caregivers repeated the same word (in the other language) in an adjacent utterance. The total number of these

translations was correlated with the number of TEs and proportion of TEs in the child's vocabulary.

### *Statistical Analyses*

Pearson product-moment correlations were used to examine the relationship between the observed amount of code switching (intra-sentential versus inter-sentential) and children's vocabulary (separately for each vocabulary count). Reported CS was calculated using ranking data, therefore, Spearman's rank-order correlation coefficients were computed to examine the correlation between the reported amount of code switching and vocabulary (separately for each vocabulary count). Finally, the number of translations in adjacent utterances was correlated with translations equivalents using a Pearson product-moment correlation.

### *Inter-rater Reliability*

The ten middle utterances from ten transcripts were transcribed and coded by a second researcher, using the previously mentioned transcription and coding conventions. Cohen's kappa coefficients were calculated to measure agreement between the two researchers for each transcript. The average kappa coefficient for use of utterance precodes ([ - spa], [ - eng], [ - mix] & [ - una]) was 0.79. The average kappa coefficient for use of code switching codes (TRA, TER, LSW & AJT) was 0.68. These coefficients are considered to represent "substantial agreement" (ranging from 0.61-0.8) (Landis & Koch, 1977). According to Fleiss' equally arbitrary guidelines, kappa coefficients between 0.4 to 0.75 indicate "fair to good" agreement (Fleiss, 1981).

## Results

Eighteen bilingual Spanish-English parents were recorded while playing with their 18 to 24-month old children. Their speech was transcribed and coded to characterize the amount and type of code switching they used when interacting with their children. Nine of the parents also provided estimates of their use of CS, based on five questions regarding code switching.

### *Coding Schema*

Intra-sentential and inter-sentential CS were coded separately in the speech samples. To quantify inter-sentential CS, there were two ways we could code the speech. If we used the Matrix Language Frame model, treating language switches as insertions into the Matrix Language (ML), each utterance produced entirely in the Embedded Language (EL) would be considered an inter-sentential CS. Therefore, every full utterance in the EL, whether produced consecutively or not, was marked as “TER” (see Table 1 for example).

However, we could also code the speech from a more alternational perspective of CS, whereby only the overall switch from one language to the other would be considered an inter-sentential CS, rather than including every consecutive utterance from the “Embedded Language”. These overall language switches were marked as “LSW”. These two approaches to CS differ most clearly in cases where a speaker produces multiple utterances in his or her second language, as in Sample 1, below. Using an alternational approach, the utterance “queso?” is not a CS since it is in the same language as the prior sentences; using a matrix model, it is a CS, as it is in the second language. Similarly, the English sentence “you don't eat bread with a spoon” is a CS by an alternational approach (as it involves a switch back to English) but not in the matrix language approach.

With an alternational view of CS, single switched words are not considered to be code switches, but rather, are either classified as established borrowings or “nonce borrowings” (Poplack, Sankoff & Miller, 1988). Established borrowings are defined by their high frequency of use and acceptability in the community, as well as their phonological, morphological, and syntactic integration into the other language (e.g., “tortilla” used in English; “internet” used in Spanish). Single switched words that do not meet all the criteria, particularly because they are not used with high frequency and accepted in the community, are considered “nonce borrowings” (Poplack et al., 1988). However, from an insertional perspective, any switched lexical item (that does not fit the criteria of an established borrowing) is considered to be a code switch (Myers-Scotton, 1997). Myers-Scotton suggests that the underlying processes behind borrowing and single-word code switching are similar, in that they both involve single lexical items being inserted into the ML, in accordance with the morphosyntax of the two languages. However, the distinction is related to the integration of borrowed words into the ML lexicon (Myers-Scotton, 1997).

The present study followed Myers-Scotton’s guidelines and used an insertional approach to quantify intra-sentential CS. Any insertion of a single word, single word plus determiner, or EL island (embedded phrase that does not follow ML word order or use ML inflections or system morphemes) was marked as “TRA”. Parents often spoke to their children using two-word sentences, sometimes code switching between the determiner and noun (e.g. “El *doggie*.”). We classified these instances as intra-sentential CS. However, if a parent switched languages and produced a one-word sentence without a determiner (e.g. “¿Qué es esto? *Doggie*.”), we classified this as an inter-sentential switch.

Table 1. Language Sample With English ML and Spanish EL

---

**SAMPLE 1**

---

\*MOT: [- eng] I think that's supposed to be a doggie bowl.

\*MOT: [- eng] yes.

\*MOT: [- spa] pan?

%csw: TER LSW

\*MOT: [- spa] pan?

%csw: TER

\*MOT: [- spa] queso?

%csw: TER

\*MOT: [- spa] pan con queso.

%csw: TER

\*MOT: [- una] tada!

\*MOT: [- spa] pan con queso.

%csw: TER

\*MOT: [- eng] you don't eat bread with a spoon.

%csw: LSW

---

*Note.* TER = inter-sentential CS (EL embedded into ML), LSW = overall language switch (alternation to other language), [- spa] = Spanish utterance, [- eng] = English utterance, [- una] = unassigned to either language

In this example, each Spanish utterance was marked as “TER” to indicate each time the EL was inserted into the English ML. The overall language switches were marked separately as “LSW” to indicate the initial switch from English to Spanish and then the later switch from Spanish back to English. Utterances that were precoded as unassigned to either language were ignored. This coding convention provided us with two different quantities of inter-sentential CS, which we analyzed separately.

### *Descriptive Statistics Overview*

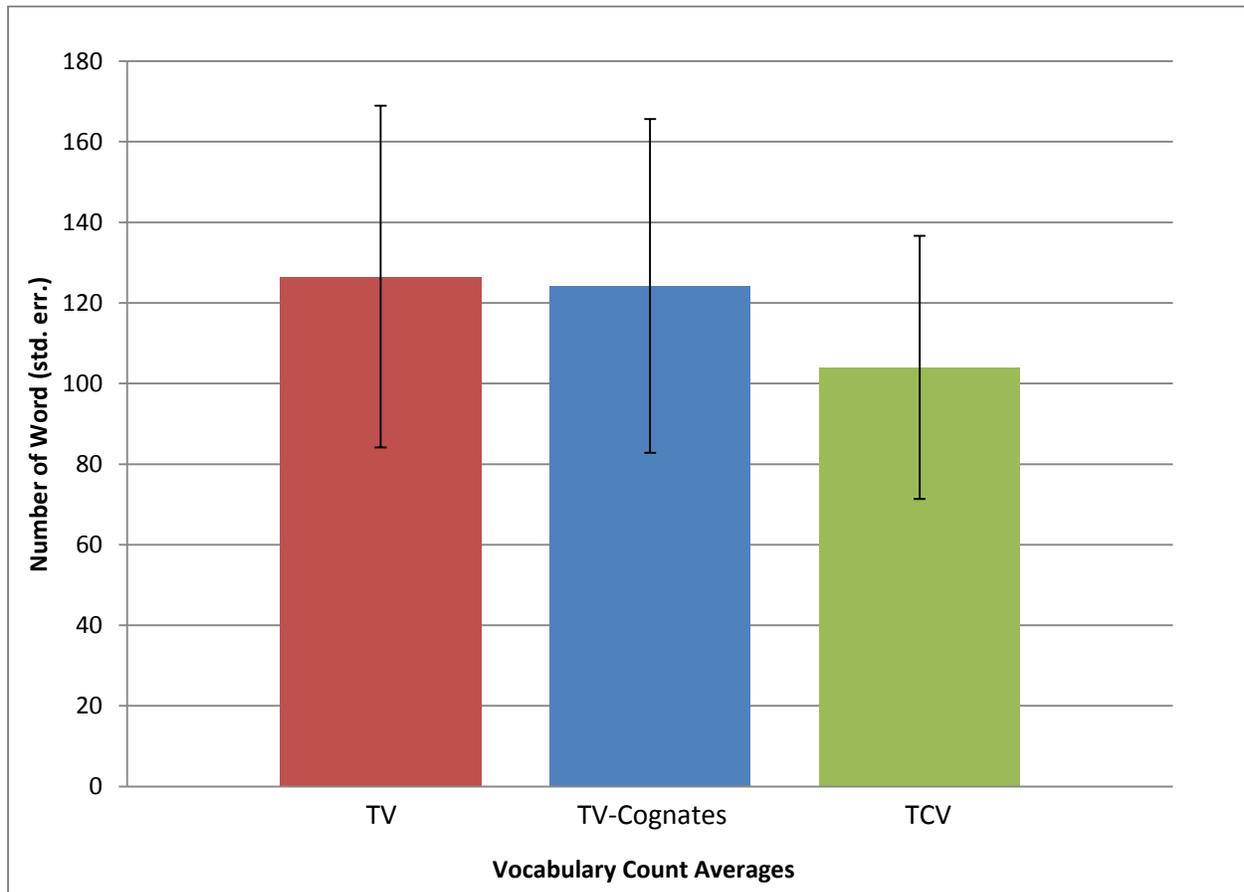
The length of the speech samples varied from 70 to 392 utterances ( $M= 243.28$ ,  $SD= 89.94$ , median=251). The range for intra-sentential code switches was 0-43 ( $M= 8$ ,  $SD= 11.5$ , median=2.5). In relation to the total number of utterances, an average of 3.6% of utterances ( $SD= 5.51$ ) contained intra-sentential CS. The range for inter-sentential CS was 0-143 (matrix approach 'TER':  $M= 28.5$ ,  $SD= 41.99$ , median=9.5) and 0-116 (alternational approach 'LSW':  $M= 27.17$ ,  $SD= 36.23$ , median=13). An average of 12.62% of utterances ( $SD= 17.03$ ) contained inter-sentential CS by the matrix approach, and an average of 11.78% of utterances ( $SD= 12.76$ ) contained inter-sentential CS by the alternational approach. Combining across types of CS, an average of 16.23% ( $SD=17.78$ ) of utterances contained code switches by the matrix approach, and 15.38% ( $SD =14.94$ ) of utterances contained code switches by the alternational coding approach.

Eight of the nine parents who provided reported CS information indicated that they code switched to some degree. Five of those eight parents reported code switching at least somewhat frequently (two of whom reported code switching often). The other three parents reported code switching on occasion, but one parent indicated that she frequently borrowed an English word when speaking Spanish.

There was a large amount of variation in children's vocabulary counts, which ranged from 3- 522 words in total (TV:  $M=126.53$ ,  $SD=174.77$ , median=48). Figure 1 presents the average vocabulary totals with standard error bars. Excluding cognates, total vocabulary ranged from 3-509 words (TV minus cognates:  $M=124.24$ ,  $SD=170.69$ , median=47). Excluding translation equivalents, total conceptual vocabulary ranged from 3-396 words (TCV:  $M=98.78$ ,

$SD=132.52$ , median=38.5). This variation may have been partly related to differences in age; however, age and vocabulary were not significantly correlated (TCV:  $r(16)=.38$ ,  $p=.12$ ).

Figure 1. Children's Average Vocabulary Totals.



Note. TV = Total Vocabulary, TV-Cognates = TV minus cognate words, TCV= Total Conceptual Vocabulary

There were an equal number of girls and boys in the present study (9 of each). On average, girls had higher vocabularies than boys (TCV:  $M=163.11$ ,  $SD=164.6$ , median=45 for girls;  $M=34.44$ ,  $SD=30.21$ , median=21 for boys). This did not seem to be due to age differences, as there was a similar spread of ages between girls and boys ( $M=20.32$ ,  $SD=1.84$  for girls;  $M=20.9$ ,  $SD=1.69$  for boys). Maternal education was also similar between girls and boys ( $M=14.67$ ,  $SD=3$ , median=14 for girls,  $M=13.56$ ,  $SD=3.57$ , median=14 for boys). There was no

significant relationship between maternal education and children's vocabulary (TCV:  $r(16) = .23$ ,  $p = .36$ ; TV & TV minus cognates:  $r(15) = .17$ ,  $p = .51$ ).

Many of the children in the present study were reported to have surprisingly low vocabularies. Ten children had total vocabularies (TV) with less than 50 words (4 girls, 6 boys). An additional child had a total conceptual vocabulary (TCV) of 10 words. Her parents had completed the vocabulary inventory incorrectly, marking all of the child's Spanish and English words on the English form. Therefore, it is unclear whether the child possessed any translation equivalents (TEs), and thus had a larger total vocabulary. However, even if she had TEs for each of her 10 words, her total vocabulary would still be less than 50 words. Therefore, 11 of the 18 children were reported to have vocabularies under 50 words. The average age of these eleven children was 19.82 months ( $SD = 0.98$ ). Maternal education did not significantly correlate with vocabulary in this subset of children ( $r(9) = .35$ ,  $p = .29$ ).

It is possible that the children in this sample may not be completely representative of typical bilingual children, as their lexical development appears to be lagging to some degree. On the other hand, parents may not have provided an accurate estimate of children's vocabularies. It is possible that parents may have underestimated their children's vocabularies. It is unclear if this is an indication of the particular families we included in our study, or if there are cultural or social differences that lead bilingual parents to estimate vocabulary differently than do monolingual American-English parents; this may be an issue for further investigation. A future second phase of this study will examine children's productive vocabularies during the play session, to see how their observed language ability relates to parent report of vocabulary.

Future studies could potentially examine children's receptive vocabulary abilities, as well, to get a better picture of children's lexical acquisition. Parent report estimates could be paired with normed vocabulary tests. However, this would require a somewhat older group of participants (e.g. 24 months) to be able to use normative data as a comparison.

### *Correlations Between Code Switching and Vocabulary – Hypothesis One*

#### *Observed Code Switching*

Our first hypothesis predicted that the amount of parental CS would negatively correlate with children's vocabulary, such that children who were exposed to a greater amount of CS would have smaller vocabularies. We expected this because we presumed that CS would present a processing challenge to young children, which could make word learning more difficult. If there was no relationship, this could mean that CS was not harmful to language development. On the other hand, if there was a positive correlation, this could be related to the function of CS, and could indicate that some types of CS are helpful for lexical development.

We found that all of the parents in our sample code switched at least one time during the play session. We had predicted that CS would occur, but that every parent did so, in only a 15-minute play session, suggests that CS may not be an uncommon occurrence in speech to young children. The amount of code switching did vary greatly from parent to parent, however, and there was significant variation between types of code switching. One parent code switched just one time, intra-sententially, during the entire play session. Two parents did not CS intra-sententially at all (but code switched a number of times inter-sententially) and four parents code switched intra-sententially only once. However, two of those four parents code switched inter-sententially more than forty times, and the other two only did so two to four times. Parents

tended to code switch more often inter-sententially than intra-sententially. These differences were significant via t-test (TRA & matrix approach:  $t(17)=-2.16, p=.05$ ; TRA & alternational approach:  $t(17)=-2.54, p=.02$ ).

Vocabulary was quantified in three ways: total vocabulary (TV: number of known words in Spanish & English combined), TV minus cognates (as cognates could inflate the total number of known words), and total conceptual vocabulary (TCV: number of concepts for which the child has at least one word). Correlations involving vocabulary were calculated separately with each of the three totals. One of the parents completed the vocabulary inventory incorrectly, marking all of the child's words (in both languages) on one MCDI, rather than differentiating between the Spanish and English vocabularies. Therefore, we could only use the TCV count from this child, since we were unable to determine whether she had any translation equivalents (TEs) in her vocabulary. Thus, for correlations involving TV and TV minus cognates, only the data from 17 participants were used.

Between children, there was a large amount of variation in vocabulary size. However, within children, the three total vocabulary counts were very similar to one another, which was likely related to the relative size of the children's vocabularies. The children's small vocabularies allowed limited opportunities to develop TEs, which will be discussed in a later section.

Correlations were conducted between each type of CS (both raw counts of CS and proportions of CS relative to total number of utterances) and each measure of vocabulary. The results of these correlations are presented in Table 2. The only significant correlations were between intra-sentential CS (TRA) and each of the vocabulary counts. There was a moderate positive correlation between the number of intra-sentential switches and vocabulary (TCV:  $r$

(16)=.52,  $p=.03$ ) as well as between the proportion of TRA relative to total number of utterances and vocabulary (TCV:  $r(16)=.52, p=.03$ ) The strength of the correlations with TRA was similar between vocabulary counts (see Table 2). A greater amount of intra-sentential CS from the parent related to a larger productive vocabulary of the child, an effect in the opposite direction of our initial prediction.

*Table 2. Correlations Between Observed CS & Measures of Vocabulary*

	<b>TV</b>	<b>TV-cognates</b>	<b>TCV<sup>a</sup></b>
<b>Observed CS</b>			
<b>TRA</b>	0.52**	0.52**	0.52**
<b>Prop. TRA</b>	0.51*	0.5*	0.52**
<b>TER</b>	-0.01	-0.01	-0.03
<b>Prop. TER</b>	-0.03	-0.03	-0.11
<b>LSW</b>	0.12	0.12	0.1
<b>Prop. LSW</b>	0.12	0.12	0.05
<b>Total CS (TRA+TER)</b>	0.12	0.12	0.1
<b>Prop. (TRA+TER)</b>	0.14	0.14	0.06
<b>Total CS (TRA+LSW)</b>	0.24	0.23	0.23
<b>Prop. (TRA+LSW)</b>	0.29	0.29	0.23

*Note.* TV = total vocabulary, TCV = total conceptual vocabulary, TCV-cognates = TCV minus cognates, Prop = proportion, TRA = intra-sentential CS, TER = inter-sentential CS (EI insertion), LSW = inter-sentential CS (alternation), \* = significant at .05 level, \*\* = significant at .03 level

<sup>a</sup> n = 18 for each correlation with TCV & observed CS. n = 17 for the remaining correlations with observed CS.

Regressions were also performed between each type of CS and each vocabulary count. Age was included as a predictor variable, to determine whether it was a contributing factor. The results of the regressions are presented in Tables 3, 4 and 5. Neither age nor inter-sentential CS (matrix & alternational approach) were significant predictors of vocabulary. However, intra-sentential CS was a significant variable. Stepwise regressions were performed with age and TRA as predictor variables. Age was excluded from the model, as it did not reach significance (TCV:  $t(16)=1.42, p>.05$ ); however TRA was a moderately significant predictor of vocabulary (TCV:  $r(16)=.51; F(2, 16)=5.72; t(16)=2.39, p=.034$ ), accounting for 26% of the variance.

*Table 3. Summary of Stepwise Regression Analyses with Predictor Variables TRA & Age*

<b>Dependent Variable</b>	<b><i>r</i></b>	<b><i>F</i></b>	<b><i>t (TRA)</i></b>	<b><i>t (Age)</i></b>
<b>TV</b>	.51	5.44*	2.33*	1.21
<b>TV-cognates</b>	.51	5.35*	2.31*	1.22
<b>TCV<sup>a</sup></b>	.51	5.72*	2.39*	1.42

*Note.* TV = total vocabulary, TCV = total conceptual vocabulary, TV-cognates = TV minus cognates, TRA = intra-sentential CS, \* = significant at .05 level

<sup>a</sup> n = 18. For all other dependent variables n = 17.

*Table 4. Summary of Multiple Regression Analyses with Predictor Variables TER & Age*

<b>Dependent Variable</b>	<b><i>r</i></b>	<b><i>F</i></b>	<b><i>t (TER)</i></b>	<b><i>t (Age)</i></b>
<b>TV</b>	.34	0.91	-0.03	1.35
<b>TV-cognates</b>	.34	.93	-0.04	1.36
<b>TCV<sup>a</sup></b>	.39	1.31	-0.11	1.61

*Note.* TV = total vocabulary, TCV = total conceptual vocabulary, TV-cognates = TV minus cognates, TER = inter-sentential CS (EL insertion)

None of these results reached significance.

<sup>a</sup> n = 18. For all other dependent variables n = 17.

Table 5. Summary of Multiple Regression Analyses with Predictor Variables LSW & Age

Dependent Variable	<i>r</i>	<i>F</i>	<i>t</i> (LSW)	<i>t</i> (Age)
TV	.35	1.0	0.4	1.33
TV-cognates	.36	1.01	.39	1.35
TCV <sup>a</sup>	.39	1.37	0.34	1.6

Note. TV = total vocabulary, TCV = total conceptual vocabulary, TV-cognates = TV minus cognates, LSW = inter-sentential CS (alternation)

None of these results reached significance.

<sup>a</sup> n = 18. For all other dependent variables n = 17.

One concern was that these correlations may have been driven by outliers, and indeed the data were positively skewed (TRA: skewness= 1.95, TCV: skewness=1.46; SES=.54).

Spearman's Rank Order Coefficients were calculated, and the results were still in the correct direction, but no longer significant (TCV:  $r(16)=.3$ ,  $p=.19$ ; TV:  $r(15)=.23$ ,  $p=.33$ ; TV-cognates:  $r(15)=.23$ ,  $p=.32$ ). This makes it less clear that there is any relationship. However, it is also the case that it is not clear how to rank-order people who all have essentially the same score (tied rankings). Thus, the Spearman's correlations may really underestimate a relationship that exists.

One of the outliers, a child with a total conceptual vocabulary (TCV) of 396 words (TV: 522; TV-cognates: 509), may have also had a role in the effect. The effect disappears when that participant's data is removed (TCV:  $r(16)=.18$ ,  $p=.47$ ; TV & TV-cognates:  $r(15)=.15$ ,  $p=.57$ ).

The relationship seems stronger with the proportion of CS relative to the total number of utterances (TCV:  $r(16)=.34$ ,  $p=.17$ ; TV & TV-cognates:  $r(15)=.32$ ,  $p=.21$ ). Although no longer significant, the relationship remains positively directed. In a larger sample, we may see stronger relationships. Future work will also need to test older children (so that there is a higher vocabulary) and assess parents over a longer period of time. Even if there is no relationship

between CS and vocabulary, this would still be a promising finding, as it would indicate that CS is not detrimental to lexical acquisition.

Overall, only intra-sentential CS seemed to have a relationship with vocabulary, although the nature of the relationship is contradictory to what we had initially predicted. Instead of intra-sentential code switching being particularly confusing for children, it seemed to facilitate vocabulary growth. It is uncertain what is contributing to this finding, and why this relationship is specific to intra-sentential CS. It may be that something about this particular type of CS is beneficial to vocabulary development. Parents often code switched the name of an object within a sentence, generally an object that they were playing with or that the parent was trying to get the child interested in (e.g. “¡Ah qué bonito *bunny!*” or “¿Dónde está el *doggie?*”). Perhaps the nature of this CS facilitates vocabulary development because the parent is drawing attention to the label of an object, and the word is often stressed and presented in sentence-final position.

It is also possible that there is something different about parents who frequently CS intra-sententially. One possibility could be that parents who are more fluent in both languages are those who CS intra-sententially more often. To investigate the relationship between fluency and intra-sentential CS, we used data from the language history and biographical information questionnaires to estimate fluency. A summary of these data is presented in Table 6. The variables we explored were age of acquisition of the second language, self-reported language proficiency, and years of education. Separate correlations were performed between each of the variables and TRA, and a regression incorporating multiple variables was performed. Only 16 questionnaires were used for some of the analyses because one participant failed to return the language history questionnaire and another did not fill it out completely.

The first variable, age of acquisition, varied greatly in our sample. Some parents reported learning both languages from birth, whereas others acquired their second language during elementary or secondary school, or later in life. The correlation between the age of acquisition and number of intra-sentential CS did not reach significance, but it was negatively directed ( $r(14)=-.25, p>.05$ ). A younger age of acquisition may have loosely related to a higher amount of intra-sentential CS.

The next variable, self-reported proficiency, was quantified using a ranking scale from 1-7 (1= little to no knowledge, 7= native-like). The majority of parents rated themselves as being equally fluent in both languages or almost equally fluent. All but one parent reported native-like proficiency in Spanish. This particular parent rated her Spanish ability as a 4, although she reported learning both languages from birth. Not as many parents reported being native-like in English, however most of the parents had at least moderate English proficiency. Four parents rated their English ability as a 4, and one parent reported a rating of 5. The lowest rating was a 3 from one parent. A Spearman's Rank Order Coefficient was used to relate proficiency rankings and number of intra-sentential switches, but there was no significant finding ( $r(15)=.09, p>.05$ ). For this analysis, we were able to use ratings from 17 of the participants.

The third variable, years of education, was fairly mixed in our sample. Almost half of the parents had completed a four-year degree, and three had also completed a master's degree. Six parents had completed either a couple years of college or a two-year degree. Three parents had an eighth grade education and one parent had a high school education. For this analysis we were able to use all 18 participants, but the correlation was not significant ( $r(16)=.11, p>.05$ ). A regression was also performed, using years of education and age of acquisition as predictor variables, but it did not yield significant results ( $r(13)=.28, F(2, 13)=.54, p>.05$ ). Neither years

of education ( $t(13)=0.44, p>.05$ ) nor age of acquisition ( $t(13)=-0.98, p>.05$ ) significantly predicted intra-sentential CS.

*Table 6: Demographic Data Related to Parental Fluency.*

	Number of Parents
<hr/>	
Age of acquisition (of 2 <sup>nd</sup> language) <sup>a</sup>	
Birth	5
4-10 years	6
10-18 years	2
18-30 years	3
Proficiency rating <sup>b</sup>	
English	
7	11
6-5	1
4-3	5
Spanish	
7	16
6-5	0
4-3	1
Parental education	
Eighth grade	3
High school degree	1
Some college (or 2 year degree)	6
4 year college degree	5
Master's degree	3

<sup>a</sup> Data was only available for 16 participants.

<sup>b</sup> Data was only available for 17 participants.

These results provide no support for the notion that parents' fluency is directly related to their use of intra-sentential code switching. This could be an indication that these measures do not adequately represent parents' fluency. On the other hand, this may not be a key factor in parents' use of intra-sentential CS.

### *Reported Code Switching*

We had hoped to also obtain a measure of reported amount of CS, using a parent-report questionnaire with five questions pertaining to code switching when interacting with their children. Parents were asked to rate the truthfulness of statements such as “I often start a sentence in Spanish and switch to speaking English” on a scale of 1-7 (1=very true, 7=not at all true). Unfortunately, we were only able to collect ratings from 9 of the 18 participants. Looking at a summary of ratings, the relationship between reported and observed CS (TRA, matrix approach, and alternational approach) seemed to be positively directed. A lower parent-report rating, which indicated more CS, tended to correspond to a greater amount of observed CS. However, these correlations did not reach significance (TRA:  $r(7)=-.23, p=.55$ ; matrix approach:  $r(7)=-.36, p=.34$ ; alternational approach:  $r(7)=-.39, p=.3$ ; total CS with matrix approach:  $r(7)=-.36, p=.34$ ; total CS with alternational approach:  $r(7)=-.38, p=.31$ )

Thus, parents’ ratings of the frequency with which they CS did not seem to be strongly tied to the observed measure of CS. This could very well be related to the lack of power driving these analyses. Alternatively, parents may not have a clear sense of how often they CS. They may not consider that what they are doing is code switching. The questionnaire did not specifically ask if parents provide translations of words to their children. That may have captured something different. Conversely, the observed amount of CS may not be an accurate representation of parents’ typical speech because the lab play session is an awkward setting.

We used a Spearman’s Rank Order Coefficient to correlate each of the reported CS rankings with each of the vocabulary counts. However, as we were only able to collect parent-report measures for 9 of the 18 participants, it was difficult to see any strong relationships.

Results of the correlations are presented in Table 7. Looking at a summary of ratings, there does not seem to be a consistent relationship between reported CS and vocabulary. However, using an average of the five ratings, there seemed to be somewhat of a positive trend. A lower parent-report rating, which indicated more CS, may have corresponded slightly with a larger vocabulary, but this correlation was not significant ( $r(7)=-.19$ ,  $p=.62$  with each vocabulary count). Using an average of three of the questions (excluding the questions regarding borrowing a Spanish or English word), there was a larger positive trend but again, it did not reach significance (with TV & TV-cognates:  $r(7)=-.36$ ,  $p=.34$ ; with TCV:  $r(7)=-.35$ ,  $p=.36$ ). This may be related to the lack of power. Also, it is unclear whether certain questions better capture CS than others, and whether it would be best to use a combined score or particular questions to compare with vocabulary.

Only correlations with one of the questions approached significance (TCV:  $r(7)=.66$ ,  $p=.06$ ). Parents were asked whether they often borrow a Spanish word when speaking English. Those who reported borrowing a Spanish word less often (when speaking English) tended to have children with larger vocabularies. It is unclear what is contributing to this marginally significant finding.

*Table 7. Correlations Between Reported CS & Measures of Vocabulary*

	<b>TV</b>	<b>TV-cognates</b>	<b>TCV</b>
<b>Reported CS</b>			
<b>(1) Eng to Spa</b>	-0.22	-0.23	-0.2
<b>(2) Spa to Eng</b>	-0.2	-0.21	-0.19
<b>(3) Borrow Spa</b>	0.62*	0.58	0.66**

<b>(4) Borrow Eng</b>	-0.06	-0.08	-0.03
<b>(5) Mix in general</b>	0.36	0.35	0.38

---

*Note.* TV = total vocabulary, TCV = total conceptual vocabulary, TCV-cognates = TCV minus cognates, (1) = switch from English to Spanish, (2) = switch from Spanish to English, (3) = borrow Spanish word, (4) = borrow English word, (5) = mix languages in general, \* = marginally significant at .07 level, \*\* = marginally significant at .06 level

### *Differences Between Intra-sentential & Inter-sentential CS in Relation to Vocabulary –*

#### *Hypothesis Two*

Our third hypothesis predicted that intra-sentential CS would be more highly correlated with vocabulary than inter-sentential CS. We predicted this because we expected that intra-sentential CS would be present more of a processing challenge for children than inter-sentential CS, as it involves a rapid switch in languages within a sentence. Thus, we expected a stronger negative relationship with intra-sentential CS than inter-sentential CS. However, there were several alternative possibilities: one or both types of CS could be positively related to vocabulary, or neither type of CS could be related to vocabulary (if CS was either not harmful or was beneficial to lexical acquisition). Another alternative was that each type of CS could be related to vocabulary in opposite directions, if they affected language development differently, or inter-sentential CS could have a stronger negative relationship than intra-sentential CS, if it was somehow more disruptive to children.

As noted before, approximately 12-13% of utterances were CS, depending on the coding approach; however, these percentages varied among parents. Inter-sentential proportion ranged from 0 to 58.13% (matrix approach) and 0 to 36.59% (alternational approach), and intra-sentential proportion from 0 to 14.05%. Thus, there was substantial variability among parents, leaving open the possibility that this variability could have an effect on children's vocabulary.

Inter-sentential CS did not significantly correlate with vocabulary in our sample (TCV:  $r(16) = -0.03$ ,  $p > .05$  with matrix approach;  $r(16) = 0.1$ ,  $p > .05$  with alternational approach). There was a moderate significant correlation between vocabulary and intra-sentential CS (TCV:  $r(16) = 0.52$ ,  $p = .03$ ), as well as between the proportion of TRA relative to total number of utterances and vocabulary (TCV:  $r(16) = .52$ ,  $p = .03$ ). As expected, intra-sentential CS had a stronger relationship with vocabulary; however, the nature of this relationship was opposite to what we had first predicted. Possible explanations for this result will be discussed again in the next section.

### *Correlations Between Translation Equivalents and CS in Adjacent Utterances – Hypothesis Three*

Our third hypothesis predicted that some parents would CS to repeat words in adjacent utterances (coded as AJT), and this would result in more translation equivalents (TEs) in their children's vocabularies. Parents tend to repeat for children when teaching words like concrete nouns. We expected that if parents repeated a word in the other language in an adjacent utterance, this would help children develop TEs.

The range of translation equivalents in the children's vocabularies varied between 0-126, with the majority of children having acquired less than 10 TEs ( $M = 22.59$ ,  $SD = 41.55$ ). There was no significant correlation between TEs and AJT ( $r(15) = .02$ ,  $p > .05$ ), nor between a proportion of TEs to total vocabulary (TV) and AJT ( $r(15) = -.07$ ,  $p > .05$ ).

In calculating the number of TEs we realized that there were a large number of cognates that parents had marked on both the English and Spanish forms (e.g., *tren* & *train*). It would be nearly impossible to determine whether these words were truly translation equivalents, especially

given children's immature articulation abilities and use of phonological processes at this age. Parents had likely been unable to attribute these cognate words to a single language and had simply marked them on both MCDIs, thus inflating their children's apparent total vocabulary.

For this reason we counted cognate words only once in the TV minus cognates count and created a separate TE count excluding these words. We performed a separate correlation between AJT and this revised TE total. Since many of the children had not yet developed many TEs, there was not much of a difference between the original and revised TE counts. Again, there was no significant correlation between the number of TEs and AJT ( $r(15) = .02, p > .05$ ), nor between a proportion of TEs to TV (minus cognates) and AJT ( $r(15) = -.11, p > .05$ ). Regressions using age and AJT as predictor variables were also performed, however they did not yield significant results (TEs:  $r(14) = .25; F(2,14) = .47, p > .05$ ; TEs excluding cognates:  $r(14) = .26; F(2,14) = .49, p > .05$ ).

From these results it seems that the frequency with which parents made translations in adjacent utterances did not contribute to the number of translation equivalents in children's vocabularies. However, our measure of AJT may not have captured the relevant aspect of code switching that potentially contributes to the development of TEs. Our earlier findings showed a positive relationship between intra-sentential CS and vocabulary, which was possibly related to a promotion of TEs in the child's vocabulary. For this reason, we performed analyses using TRA as a variable, to determine whether this type of CS had a direct relationship with TEs.

A moderate positive correlation was found between TRA and each TE count (TEs:  $r(15) = .56, p = .02$ ; TEs excluding cognates:  $r(15) = .55, p = .02$ ). There was a marginally significant correlation between the proportion of TEs and TRA ( $r(15) = .46, p = .06$ ), but the correlation with

the proportion of TEs excluding cognates was not significant ( $r(15) = .43, p = .08$ ). In general, more intra-sentential CS corresponded with more translation equivalents, even when controlling for total vocabulary size (by proportioning TEs).

Once again, there is the concern that this relationship is driven by outliers, as both variables were positively skewed (TRA: skewness = 1.95, SES = .54; TEs: skewness = 1.89; SES = .55, TEs excluding cognates: skewness = 1.91; SES = .55). Spearman's correlations were calculated and the correlations were still positively directed, but no longer significant (TEs:  $r(15) = .17, p = .43$ ; TEs excluding cognates:  $r(15) = .12, p = .53$ ). However, it remains unclear how to appropriately rank participants, as many children had the same small number of TEs in their vocabularies and many parents code switched within sentences to a similar degree.

One of the outliers may have had a role in the effect. The effect disappears when this outlier is removed (TEs:  $r(14) = .15, p = .58$ ; TEs excluding cognates:  $r(14) = .14, p = .61$ ). This could suggest several explanations: the correlation might be an artifact driven by a single outlier. However, that outlier actually had a vocabulary measure more in line with what would be expected given her age; it may be that effects of CS can only be seen in children who have either larger vocabularies or more typical vocabularies. Further research will need to examine older children who have larger vocabularies and have developed more TEs.

If, in fact, higher numbers of intra-sentential CS tend to relate to both larger vocabularies and more translation equivalents, it is possible that this particular type of code switching is somehow helpful in teaching TEs, which contributes to a larger vocabulary. If this were the case, we might have expected a difference between TRA's correlation with TV and TCV (and TCV excluding cognates), since the TCV count was intended as a measure to exclude TEs. However,

in our sample, there was very little difference in the correlations between each of the vocabulary counts because many of the children had relatively small vocabularies and few TEs.

Therefore, we were unable to strongly differentiate between TV and TCV, and compare the relationship between CS and a vocabulary total that omitted TEs. Consequently, it is unclear whether the positive relationship between TRA and vocabulary was primarily driven by the promotion of TEs, or by some other factor. If the children in our sample had larger vocabularies and a TCV that was significantly different from their TV, it would presumably be easier to make a distinction when interpreting these results.

Interestingly, parents provided translations when code switching inter-sententially, as well, but this type of CS did not have a strong relationship with vocabulary or TEs. However, AJT correlated very strongly with inter-sentential CS (matrix approach:  $r(15) = .95, p < .001$ ; alternational approach:  $r(15) = .89, p < .001$ ), whereas its correlation with TRA did not reach significance ( $r(15) = .38, p = .13$ ). This is likely because adjacent translations most often occurred within an inter-sentential CS. However, although more translations were provided in this fashion, inter-sentential CS was not significantly correlated with TEs (matrix approach:  $r(15) = .04, p > .05$ ; alternational approach:  $r(15) = .16, p > .05$ ).

## Discussion

The present study investigated characteristics of parents' code switching behavior when addressing their children, and the relationship between this CS and children's vocabulary development. Among our sample, parents code switched differently and to differing degrees, but each parent code switched at least one time during a 15-minute play session. Parents code switched more often inter-sententially than intra-sententially; however, only intra-sentential CS

had a statistically significant relationship with vocabulary. Contrary to our prediction, higher amounts of intra-sentential CS corresponded with larger vocabularies. Reported CS, on the other hand, did not have a significant relationship with vocabulary. Parents were observed to translate words in adjacent utterances, but this behavior did not correlate with the number of translation equivalents (TEs) in children's vocabularies. However, interestingly, TEs were positively related to intra-sentential CS. As a way of organizing the discussion, we first present an overview of parents' observed CS behavior, report on our three main predictions, and then discuss some of the implications.

All parents were found to code switch to some degree. Even those parents who claimed to only speak to their child in one language code switched at least once. Perhaps these parents only code switch occasionally for specific words, but nonetheless, it appears that code switching may be more customary in speech to young children than we had expected. The fact that CS frequently occurs justifies future research, so that we can understand what the implications are for this.

Parents were found to CS more often inter-sententially. We measured inter-sentential CS according to two different theoretical perspectives, and by either approach, CS occurred between sentences more frequently than within sentences. The differences were significant, but it is unclear what is driving this preference for code switching inter-sententially. There are several possible explanations. The first is that parents CS more frequently between sentences because it could potentially be less disruptive to the child. That is, a switch that occurs at a logical boundary might be less disruptive than one that occurs inside a sentence. Intra-sentential CS generally consists of one or a few words from the second language being inserted into an utterance in the first language. Our presumption had been that this type of CS would be more

disruptive to processing, and potentially more confusing for children. This possibility may be one factor in why parents do not switch inside a sentence as often. However 61% of parents produced intra-sentential CS more than once (89% at least once), suggesting that parents were not generally trying to avoid these altogether.

Another possible reason for this preference for inter-sentential CS could be related to the language proficiency of the parents. Intra-sentential CS is argued to require a higher level of mastery of both languages' grammars in order to CS easily and appropriately (Poplack, 1980). If this is true, we would expect more intra-sentential CS in those parents who were more skilled in both languages. However we did not find that proficiency was related to intra-sentential CS, in our sample. Perhaps our measures of proficiency (based on parent-report) did not accurately reflect parents' ability in each language. It is possible that the majority of parents in our sample were not balanced bilinguals, and thus had more difficulty code switching within sentences. On the other hand, parents' self-reports may have been fairly representative of their proficiency and inter-sentential CS may, in fact, require a higher level of proficiency in both languages. A speaker generally must be capable of forming full grammatical sentences in each language to CS between sentences, whereas within-sentence CS can involve the insertion of just one word.

Many of the parents' code switches were translations of words that they had previously said in the other language. This repetition across languages is not a behavior that is commonly seen in adult-adult speech, unless it is used out of emphasis or to clarify a word with which the listener does not seem to be familiar. In the present study, however, it seemed to be used as more of a teaching tool, or as an attention-getting device. Words like "look" and "come here" were often code switched and sometimes repeated again in the other language (e.g. "Look at this! ¡Mira! Look look!").

We hypothesized that the relationship between parental CS and children's vocabulary would be negatively directed, such that children who were exposed to a greater amount of CS would have smaller vocabularies. Only intra-sentential CS was significantly correlated with vocabulary; however, the nature of this relationship was opposite to what we had expected. Children of parents who code switched more frequently tended to have larger vocabularies. This significant result was found using both the number of CS and the proportion of CS to the total number of utterances. Therefore, this finding was not tied to how much or how little the parent spoke during the play session.

However, this relationship may have been affected by outliers, as both variables were found to be positively skewed. When recalculated using a Spearman's Rank Order Coefficient, the correlations between intra-sentential CS and vocabulary were still positively directed, however, no longer significant. This made it less certain that a real relationship existed. However, it is unclear how to rank-order a group of participants who, in general, had effectively the same scores (as many children had small vocabularies and many parents code switched to a lesser degree). Therefore, the use of a Spearman's correlation may have underestimated a relationship that indeed exists. When the largest outlier was removed, the effect was also non-significant. This outlier may have had a role in the effect. Future research will need to evaluate older children, who have larger vocabularies, and examine parents over an extended period of time.

Inter-sentential CS, on the other hand, did not have any significant relationship with vocabulary and there was no apparent trend in one direction. Children did not seem to be confused or hindered by code switching, and this did not appear to be due to a lack of power. Reported CS, as measured by parent report, also did not have a significant relationship with

vocabulary. This may have been related to a lack of power, but the relationship was positively directed, nonetheless. It appears that code switching may not be disruptive to children's lexical acquisition. There were no significant negative relationships between CS and vocabulary.

There are many supporters of the one-parent-one-language (OPOL) approach to raising bilingual children who believe that keeping their languages strictly separate, consistently speaking only one language to their child, and insisting that their child speaks to them in the same language, is the ideal method for raising bilingual children (e.g. Barron-Hauwaert, 2004). Blogs on the internet and books in the popular press encourage the OPOL method, saying that it is the most effective strategy to raise bilingual children. One blog, "Spanglish Baby: Raising Bilingual Kids," provides tips for maintaining the OPOL strategy and gives reasons why OPOL "is the way to go" (Soto, 2009). The author of a book on raising bilingual children (Steiner & Hayes, 2008: *7 Steps to Raising a Bilingual Child*) says in the blog that OPOL is simple and effortless for parents; however, in the present study, speaking strictly in one language did not seem quite so simple for parents. Even those parents who claimed to use only one language with their child still produced some code switches. Consciously monitoring one's speech to be sure to speak in only one language would likely require constant effort, and it may be much more natural for a parent to code switch freely as they choose. There is an implication that mixing languages is not as advantageous as keeping them separate. However, in the present study, many parents code switched to some degree and this CS did not have any negative effects on language development. On the contrary, it may have even been helpful to lexical acquisition.

It is unclear exactly what is contributing to the positively directed relationship between intra-sentential CS and vocabulary. One possibility is that parents who code switch are somehow different from parents who do not CS, and that this difference also affects their children's

outcomes for an unrelated reason. We explored this possibility, using fluency and education, and found no relationship between these variables and code switching. While there are other ways in which parents could differ, the fact that fluency is not a factor seems to suggest that the relationship is really between CS and vocabulary (that CS is not a proxy for something else). However the direction of the relationship is unclear. It could be that CS in parent's speech is facilitative, helping children learn vocabulary. It is also possible that parents avoid CS until they feel their child's linguistic capacity is sufficient to handle it.

In order to distinguish between these two possible explanations, a longitudinal study would need to be used in future research. This would provide the opportunity to track children's language development over time and simultaneously monitor parents' CS behavior as their child's language ability progresses. Parents' specific CS behaviors could be characterized over the course of the study and the relationship between CS and vocabulary could be assessed at multiple points throughout a longitudinal study.

A longitudinal study could also be used to examine the distinction between inter-sentential and intra-sentential CS in relation to vocabulary. We had expected that intra-sentential CS would be more highly correlated with vocabulary than inter-sentential CS, but that both would be significantly related to vocabulary. As predicted, there seemed to be a stronger relationship between vocabulary and intra-sentential CS, however inter-sentential CS did not have any significant correlation with vocabulary. One possible explanation for this non-significant finding could be related to the function of the inter-sentential switches. Often inter-sentential switches were used as attention-getting devices, which likely does not contribute much linguistically. Thus, those instances would not be expected to have a strong relationship with vocabulary development. Intra-sentential CS, on the other hand, frequently involved the insertion

of a label for an object, often in sentence-final position. Perhaps this contributed to a facilitative effect on lexical acquisition. Another possibility will be discussed in relation to our final hypothesis.

Our final hypothesis was that some parents would CS to provide translations in adjacent utterances, and this would correlate with higher numbers of translation equivalents (TEs) in their children's vocabularies. Many parents did translate words during the play sessions, but there was no significant relationship between translations in adjacent utterances and children's TE totals.

Since intra-sentential CS had been found to positively relate to vocabulary, we decided to further investigate this relationship by correlating this type of CS with TEs as well. We found that intra-sentential CS had a moderate positive correlation with the number of TEs in children's vocabularies, as well as a marginally significant positive correlation with the proportion of TEs relative to vocabulary. Therefore, the relationship was not driven purely by vocabulary size, *per se*.

However, the relationship may have been driven by outliers, as both intra-sentential CS and TEs were positively skewed. Again, the variables were not significantly correlated using Spearman's correlations, but the relationship remained positively directed. It is difficult to determine whether or not the Spearman's correlations misrepresented a relationship that, in fact, existed. Again, when the largest outlier was removed, the effect was non-significant. Therefore, this outlier may have contributed to this effect. Further research will need to assess older children in order to conclude whether or not these variables are truly related.

Although not significantly correlated, there did seem to be an association between higher amounts of intra-sentential CS and both a larger vocabulary and a higher number of TEs.

Therefore, it is possible that the positive relationship between intra-sentential CS and vocabulary is related to a promotion of TEs in children's vocabularies. However further research is needed to attempt to explain this connection.

Perhaps children of parents who frequently code switched intra-sententially had larger vocabularies because they had acquired more translation equivalents. If this were the case, we would have expected to see a difference between the correlations with CS and TV versus TCV. However, the majority of children in our sample had relatively small vocabularies, with few TEs, which didn't allow for enough variation between the two vocabulary counts to observe major differences in the correlations. Future studies, involving children with pronounced differences between their TV and TCV counts, should be helpful in determining whether the positive correlation between TRA and vocabulary is driven by a promotion of translation equivalents.

It is possible that intra-sentential CS positively correlated with TEs because something about this type of CS is beneficial to TE development. Perhaps when a single-word translation (in the second language) is presented within an utterance in the first language, this captures the child's attention more effectively than presenting the translation within a switched utterance that is completely in the second language (e.g. "¡Oh aquí hay un *fishy!*" versus "Oh aquí hay otro juguete. *It's a fishy!*"). There may be a more marked emphasis on the single switched word compared to an entirely switched sentence in which the key translation is embedded.

Evidence to potentially support this idea could come from the lack of a significant correlation between inter-sentential CS and both TEs and vocabulary. Although translations often occurred within an inter-sentential CS, this type of CS was not significantly correlated with TEs. It did not seem to contribute to the development of translation equivalents. Perhaps, similar

to what we found with intra-sentential CS (but in the opposite direction), the lack of a significant correlation between vocabulary and inter-sentential CS may have been partly related to the lack of a significant relationship between inter-sentential CS and TEs.

However, one concern with the notion that intra-sentential CS may be more helpful in teaching TEs, because it provides a more pronounced emphasis on the single switched word, is that many of the intra-sentential switches in our sample did not occur within the context of a full sentence. Often these switches occurred within a simple noun phrase (e.g. “Un *fishy*.”). Presumably, when looking at this example within the context of the conversation, although the switch occurred within a simple noun phrase, there would have likely been several utterances before, and even after, in the first language (Spanish, in this example). Therefore, the insertion of the one word in the second language would have still been an abrupt switch from what the child was previously parsing (e.g. “Bueno, vamos a jugar. Hay muchos juguetes aquí. ¿Qué quieres, mijo? ¿El *fishy*? Bueno toma. ¿Qué más?”) However, there were many inter-sentential CS that consisted of one or two words, which would again be considered abrupt switches, but inter-sentential CS did not correlate with TEs (e.g. “Hay muchos juguetes aquí. ¿Qué quieres, mijo? *The fishy*? Bueno toma. ¿Qué más?”).

Future research would need to explore the relationship between CS and TEs further, in order to better understand the nature of the correlation. One way to assess this relationship would be to use a word-learning experiment with young children and different types of CS. Fennell and Byers-Heinlein (2011) found that 17 month-old bilinguals were able to learn novel minimal pairs when presented in the context of a single-language sentence, but a mixed-language condition was not included in the study. There was also no alternation between languages for each trial. That is, infants either heard only French sentences or only English sentences. Perhaps repeating this

study, using trials involving within-sentence switches, as well as switching languages between sentences, would reveal differences in performance and provide a better idea of how different types of CS affect word learning. Earlier, in our review of the literature, we suggested that a mixed sentence may be a more challenging context in which to learn a new word. However, in light of our current findings, we might expect bilingual children to perform just as well, or maybe better, in the mixed-language context.

Another concern regards the coding conventions and how they may have contributed to our findings. Utterance boundaries were used in helping to differentiate between intra-sentential and inter-sentential CS. However given the nature of parents' speech to their children, which is characterized by short phrases typical of child-directed speech (CDS), it was challenging to make standard distinctions between types of CS, as one would do when analyzing adult-adult speech. For example, utterances such as "Look *gafas!*" compared to "Look!... ¡*Gafas!*" were differentiated using pausing and intonation, and the type of CS was determined based on this distinction. In an adult-adult context, types of CS would normally be more easily distinguished, as adults would be expected to generally speak in longer and more complete sentences. This would make the type of CS more obvious, such as in the examples "Look at those *gafas* over there!" versus "Look over there! ¡*Hay muchas gafas allá!*". Therefore, when coding parents' speech in the present study, two out of three criteria were used to define utterance boundaries, and thus distinguish between intra-sentential and inter-sentential CS (i.e., pausing, intonation, and structural endings). Future studies should further examine and elaborate on coding conventions for CS within child-directed speech. Some ideas will be presented in a later section.

In the present study, there were some relationships heading in the expected direction that did not reach significance, perhaps due to a lack of power. Some results, such as the positively

directed relationship between reported CS and vocabulary, as well as between reported CS and observed CS, looked like trends that might have been more prominent in a larger sample. We cannot be sure, but it seems like those might actually be real relationships that we are unable to see because of the variability. The relationship between CS and vocabulary was contradictory to our hypothesis that CS would present processing costs to children and cause detriment to their lexical development. However, the positive finding was in line with our prediction that some types of CS could potentially facilitate learning. We did not find that immediate translations resulted in more TEs; however, intra-sentential CS did seem to benefit TE development, along with vocabulary.

These findings also contradict a recent study by Byers-Heinlein (2012) that found a negative relationship between CS and vocabulary development. However, different methodologies were employed. Children's vocabulary was measured similarly, using a parent-report inventory. However, Byers-Heinlein used only a Language Mixing Scale, which provided a reported CS score, as a measure of parental code switching. Perhaps Byers-Heinlein's finding was related to the use of a reported measure of CS. Reported CS scores may not have provided an accurate representation of parents' actual CS. Byers-Heinlein did caution that the Language Mixing Scale had not yet been correlated with direct observation of CS. Thus, although it appeared to be a valid measure of CS, it may not have provided as accurate a representation as observed CS. Interestingly, the same scale was used in the present study to measure reported CS, and those scores did not significantly correlate with observed CS. However the relationship was positively directed, suggesting that a significant correlation may have been seen with a larger sample. Another possibility is that the two measures (observed & reported CS) are capturing different concepts.

Nonetheless, the difference in methodologies cannot be the only cause of the contradicting findings. In the present study, reported CS did not significantly correlate with vocabulary, but the relationship was somewhat positively directed. This may have been related to a lack of power. Observed CS, however, had a significant positive correlation with vocabulary. There could be several reasons for the results of the current study heading in a direction opposite to the results of the Byers-Heinlein study.

There were many differences between the two studies. One possible explanation could be related to the ages of the participants. We tested children in a similar age range to Byers-Heinlein's participants (18-24 months), however that study tested two separate groups: one with an average age of 18 months (range 17.8-18.22 months) and the other with an average of 24 months (22.11-26.22 months). The fact that the present study included children across such a broad age range, rather than from separate, more concentrated age groups, may have contributed to the results. Moreover, children in the age range of 18-22 months were not represented in Byers-Heinlein's study. However, the present study included many participants from this age range; in fact 13 of our 18 participants were between 18.22 and 22.11 months of age. Perhaps there is something different about the vocabulary development of bilingual children within this particular age group. Conducting a longitudinal study would help to explore this possibility and address the conflicting findings.

Another major difference is that Byers-Heinlein's study only assessed English vocabulary, whereas the current study assessed vocabulary in both languages. With the Byers-Heinlein's group of 18-month old children, a significant negative correlation was only found between CS and their receptive vocabulary. We did not assess receptive vocabulary since we were getting a total vocabulary count and it would be difficult for parents to reliably distinguish

between children's receptive vocabulary in each language. Byers-Heinlein found no correlation with productive vocabulary at 18 months and a marginally significant correlation at 24 months. The 18-month non-significant result does not contradict our positive finding, and the 24-month result is only marginally significant in the opposite direction. Perhaps it is related to their use of an English-only vocabulary assessment.

Another important difference regards the sample sizes used. Byers-Heinlein's study had many more participants than the current study (129 in the 18-month group & 39 in the 24-month group, compared to 18). It is possible that the correlations found in this study would not be evident in a larger scale study with more opportunities for large variability between participants. It would be important for future studies to use a larger sample to further examine the relationship between observed CS and vocabulary.

### *Limitations*

There were several limitations to the current study. The sample size was fairly small, and many of the children had relatively small vocabularies. This made it difficult to see differences between analyses with total vocabulary versus total conceptual vocabulary. We were also unable to fully explore the nature of the relationship between CS and translation equivalents since a number of the children had not yet developed many.

It is also possible that the children in the sample did not accurately represent typical bilingual children of their age. They may have been slightly delayed in their lexical development compared to other same-aged bilinguals. On the other hand, parents may not have accurately estimated their children's vocabularies when completing the language inventories. Receptive

vocabulary was also not assessed in this study. Combining receptive and expressive measures of vocabulary could provide a broader picture of children's lexical development.

Another limitation was that the participants were from a diverse range of socio-economic backgrounds. Socio-economic status has been found to relate to language development (Hoff, 2003, 2006). This variable may have played a role in the apparent vocabulary development of the children in our sample, as we were unable to control for it.

A further limitation was that the laboratory was not a naturalistic setting. Parents may not have spoken to their children as they typically would have, and thus may have code switched more or less often than usual. As half of the parents did not provide a reported measure of CS to use as a comparison, it is unclear how representative the observed CS was of parents' normal behavior. Furthermore, the questions used to assess reported CS may not have adequately captured code switching. There was no specific question regarding parent's use of CS to translate in an adjacent utterance (or in general), which was a common behavior observed in the play sessions. Parents may not have considered this behavior when answering the reported CS questions, and may not be fully aware of the extent to which they code switch in general.

Finally, the coding schema used may not have been the best method of analyzing parents' code switching behavior. This will be discussed in the following section.

### *Coding Decisions and Their Implications*

The way in which the transcripts were coded was an important component of this study. As there was a dearth of research specifically focused on CS directed to young children, there was a lack of well-established conventions to utilize. Therefore, it was decided to characterize code switching similarly to the way in which adult-adult CS is analyzed.

Since there are differences in theoretical perspectives regarding code switching, inter-sentential CS was classified in two ways, according to the both a Matrix Language Frame model and an alternational approach. This provided two different calculations of inter-sentential CS, which were analyzed separately. These quantities were fairly similar; however it is uncertain whether one coding method provides a better representation of inter-sentential CS, or whether one would be more relevant to child language development, perhaps in a larger sample.

One pattern of CS that was frequently observed was a language switch between a determiner and a noun. This was coded as an intra-sentential CS since it occurred within a noun phrase. A typical intra-sentential CS in adult-adult speech could occur between a determiner and noun, but would normally occur within the context of a complete sentence (e.g. “Necesito ir al *daycare*.”). In many instances, parents code switched between a determiner and noun when speaking in two-word sentences (e.g. “El *doggie*.”).

However, when a parent switched languages and produced a single word with no determiner, this was considered an inter-sentential CS (e.g. “¿Qué es esto? *Cheese*.”). It is unclear whether this coding distinction between single switched nouns and determiners plus switched nouns is an appropriate distinction to make, given that they are not very different. They may not be interpreted differently by children. Thus, one possibility is that they are both interpreted as abrupt language switches that capture children’s attention, and perhaps facilitate their learning of the word. Future researchers may want to add a code that combines these specific examples of CS and explore whether these instances of CS have a distinct relationship with vocabulary, when combined, compared to when they are analyzed separately. Alternatively, single word inter-sentential switches could be regarded as intra-sentential CS, and future

researchers could investigate whether the addition of these instances of CS changes the relationship between vocabulary and intra-sentential CS or inter-sentential CS in any way.

Another concern, related to coding, was that the type of code switching that parents used when interacting with children was somewhat different from the type of CS generally observed between adults. Parents' speech, in general, was characterized by many more two-word sentences and short phrases than would be expected when addressing an adult. These short utterances are typical of child-directed speech (CDS), but a typical manner of code switching when using CDS has not been established. Parents often switched languages to provide translations of words and seemed to code switch when trying to get their child's attention. It was unclear whether these instances of CS, which are less characteristic of adult-adult speech, should have been treated differently or analyzed separately.

In regards to the measurement of inter-sentential CS, it is possible that for adult-child CS, only the initial switch into the other language is important. Rather than coding each consecutive insertion of an EL utterance as a CS, or coding the switch out of and back into the ML, perhaps only the initial switch is relevant. It is also possible that some code switches are less significant than others. For example, code switching between utterances to get the child's attention (e.g. "Look! ...¡Mira!) may not be as relevant to language development, and may not be considered the same as an inter-sentential switch to produce a full utterance in the EL (e.g. "Look over here! ¡Mira todos los juguetes!"). Of the two ways we coded inter-sentential CS, it seems that the alternational approach, where we marked only the entrance into the EL and then back to the ML, may have provided a better measure. This measure of inter-sentential CS had a somewhat stronger relationship with vocabulary. However, again, CS when speaking to children differs

from CS between adults. For this reason, it may not be appropriate to analyze code switching in the same manner as one would when examining adult-adult speech.

### *Future Research*

Future research should attempt to address the aforementioned limitations. It would be beneficial to use a larger sample, with higher socio-economic backgrounds, as SES has been shown to be related to vocabulary development (Hoff, 2003, 2006). In our sample we had a fairly diverse range of SES. It would be preferable to use a sample with higher SES, to attempt to keep that variable constant and minimize its contribution to the data.

In order to perhaps get a more accurate representation of parents' everyday speech to their children, future research might observe parent-child interactions in the home. Observing interactions over multiple visits might also provide a more representative language sample compilation from which to analyze. To get a better estimate of reported CS, questionnaires could incorporate more questions and perhaps explain or give examples of language switches, as some people may not realize that they are engaging in this behavior. If CS is different in CDS, or if the CS behavior we observed is not typical for adult-directed speech (ADS), parents might similarly not think about those things as being code switches. That is, their answers may refer to the kinds of CS typically seen in ADS, but not incorporate estimates of the behaviors observed in the present study. Questionnaires could possibly include a question regarding code switching to translate (both in an adjacent utterances and in general), as this behavior was frequently observed but not directly addressed in the questionnaire.

Future research should be performed with children who are slightly older and have developed more robust vocabularies. This would allow for the possibility of comparing total

vocabulary and total conceptual vocabulary separately. Additionally, this could potentially bring light to the apparent relationship between intra-sentential CS and translation equivalents. There could also be a comparison made between the amount and type of CS to young children of different ages (e.g. between 18-30 months of age), and any differences in the relationship with CS and vocabulary between different age groups.

Including receptive vocabulary measures could also provide a broader representation of children's language development. Receptive and productive estimates of vocabulary, paired with normed language tests, could also help to verify parent report of lexical acquisition. The second phase to this study will compare children's observed language abilities in the play session with parents' reports of vocabulary on the language inventories.

In regards to the observed measure of CS, it is uncertain whether the coding schema used in the present study was the best method for analyzing adult-child code switching. Improving the coding schema or developing a new coding method may be helpful for future studies. Alternative methods for coding inter-sentential CS, in particular, should be investigated. Perhaps future studies could incorporate additional codes for instances of CS between two-word sentences and for single-word sentences, for example, and explore differences with various coding conventions.

Finally, future research might attempt to tease apart the factors contributing to the positive relationship between intra-sentential CS and vocabulary. It is possible that either parental code switching is helpful to children or parents are code switching more because their children have progressed to a level where they can handle it. Future work looking longitudinally at a group of bilingual children could help to determine the nature of the relationship and also address other questions, such as the relationship between CS and TEs.

## *Conclusions*

In the present study we found that parents do not seem to avoid code switching for fear of confusing their child. Children are actually exposed to CS fairly often. This code switching does not seem to be harming them. There was no correlation between vocabulary and inter-sentential CS and a positively directed relationship between vocabulary and intra-sentential CS. There was nothing to indicate any impaired vocabulary as a result of code switching.

These are encouraging findings, as they indicate that code switching when speaking with young children may not be detrimental to their language development, as some theories suggest (e.g. Barron-Hauwaert, 2004: *The one-parent-one-language approach*). In fact, one type of CS may be helpful to children. Intra-sentential CS may be beneficial to vocabulary development, and may help in building translation equivalents.

The results of this study may be useful to families who are raising bilingual children. Code switching is a natural way of speaking that comes easily for many bilingual adults, and it may not be advisable to inhibit code switching when addressing a bilingual child. Much more research is needed to provide further insights into the relationship between code switching and lexical acquisition, but this study presents a preliminary exploration of this area and has uncovered some potentially promising findings for bilingual parents and children.

Figure 2. Correlation Between Number of Intra-sentential CS and Total Vocabulary (TV) Minus Cognates

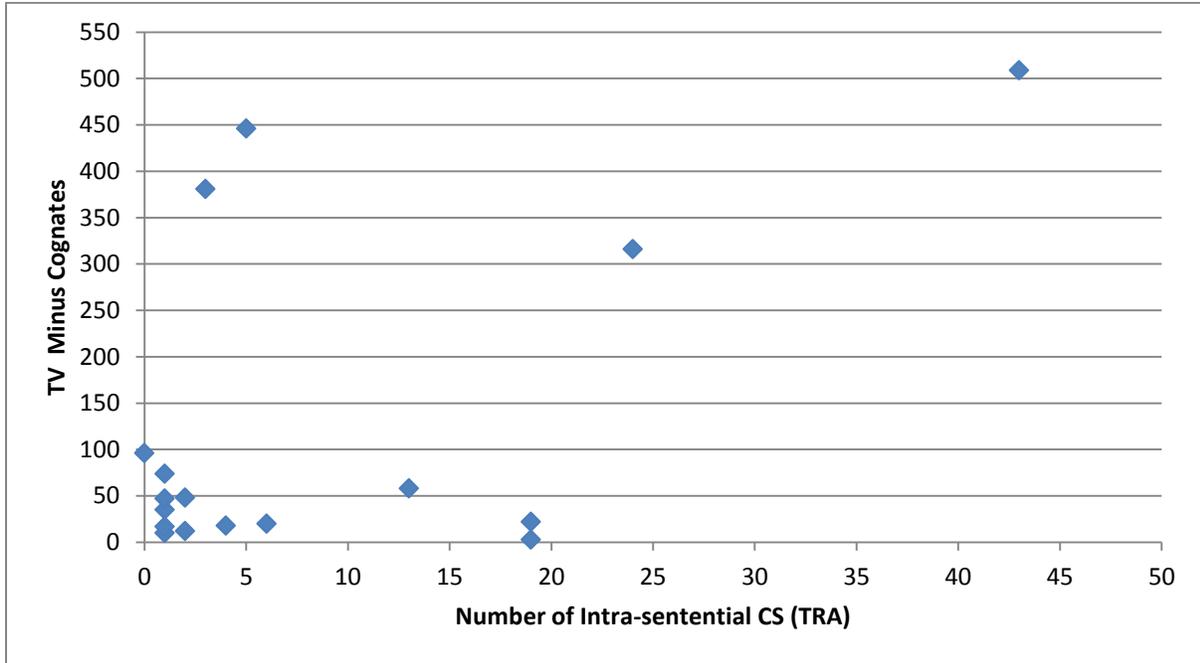


Figure 3. Correlation Between Number of Intra-sentential CS and Total Vocabulary

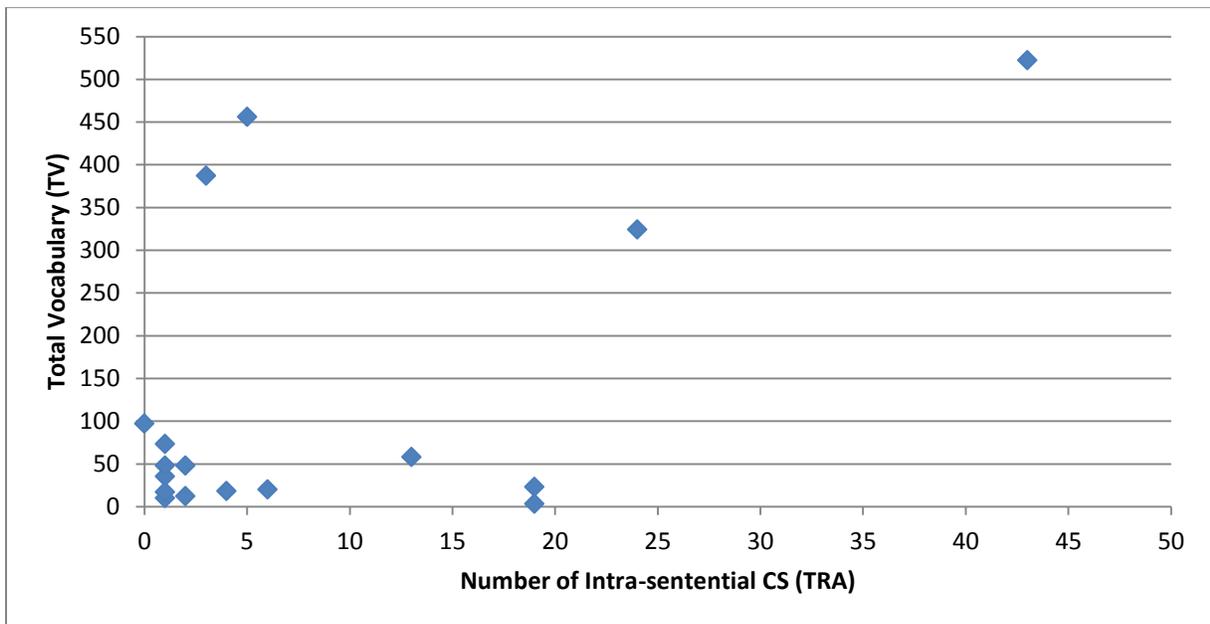


Figure 4. Correlation Between Number of Intra-sentential CS and Total Conceptual Vocabulary

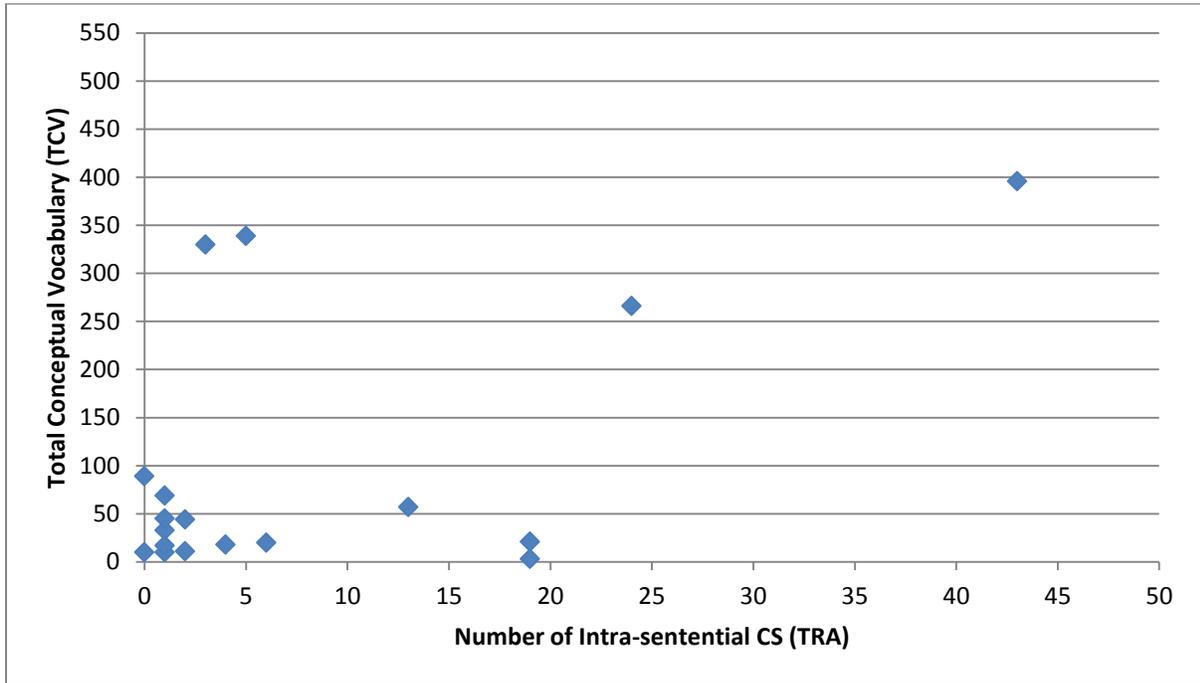


Figure 5. Correlation Between Proportion of Intra-sentential CS and Total Vocabulary (TV) Minus Cognates

Minus Cognates

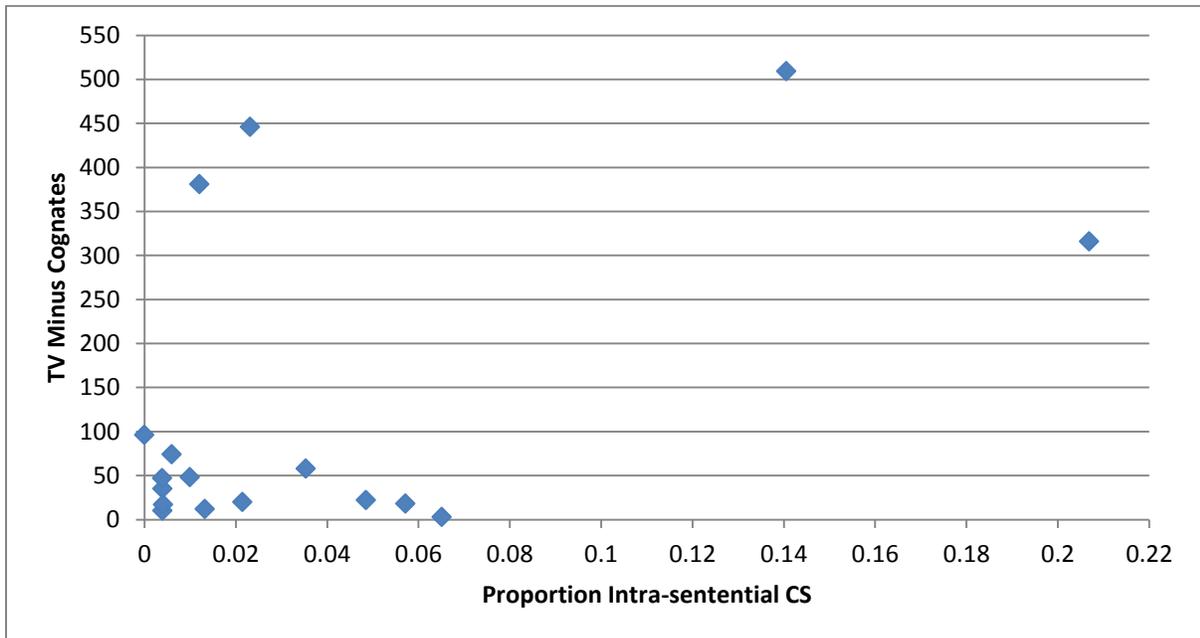


Figure 6. Correlation Between Proportion of Intra-sentential CS and Total Vocabulary

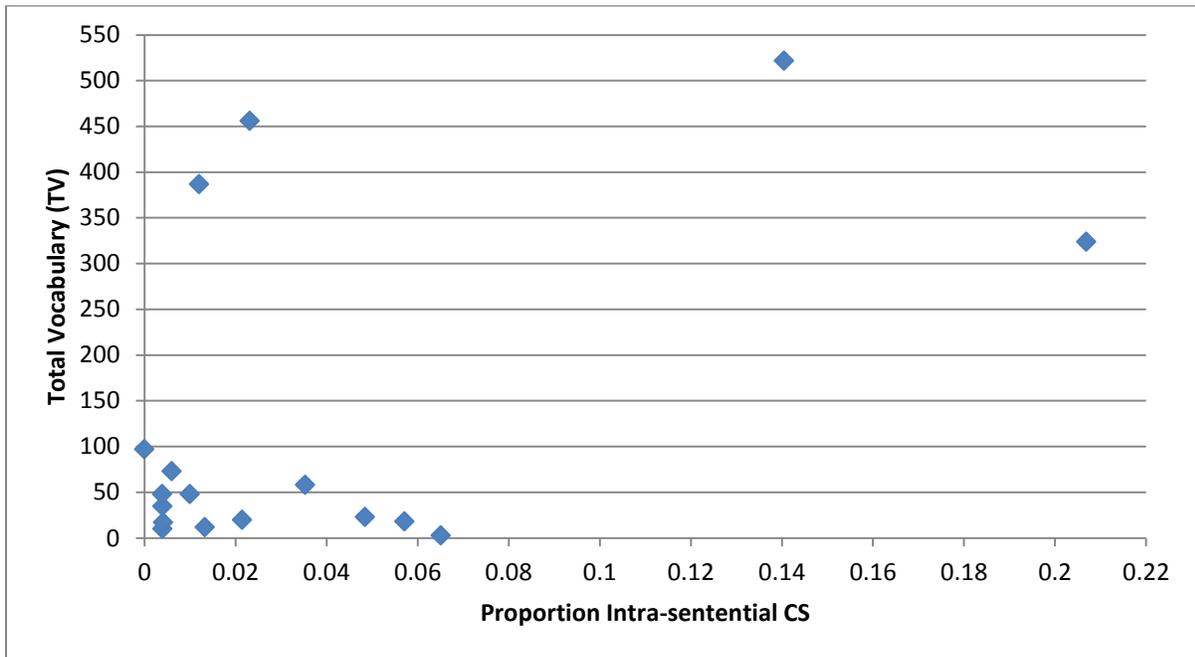


Figure 7. Correlation Between Proportion of Intra-sentential CS and Total Conceptual Vocabulary

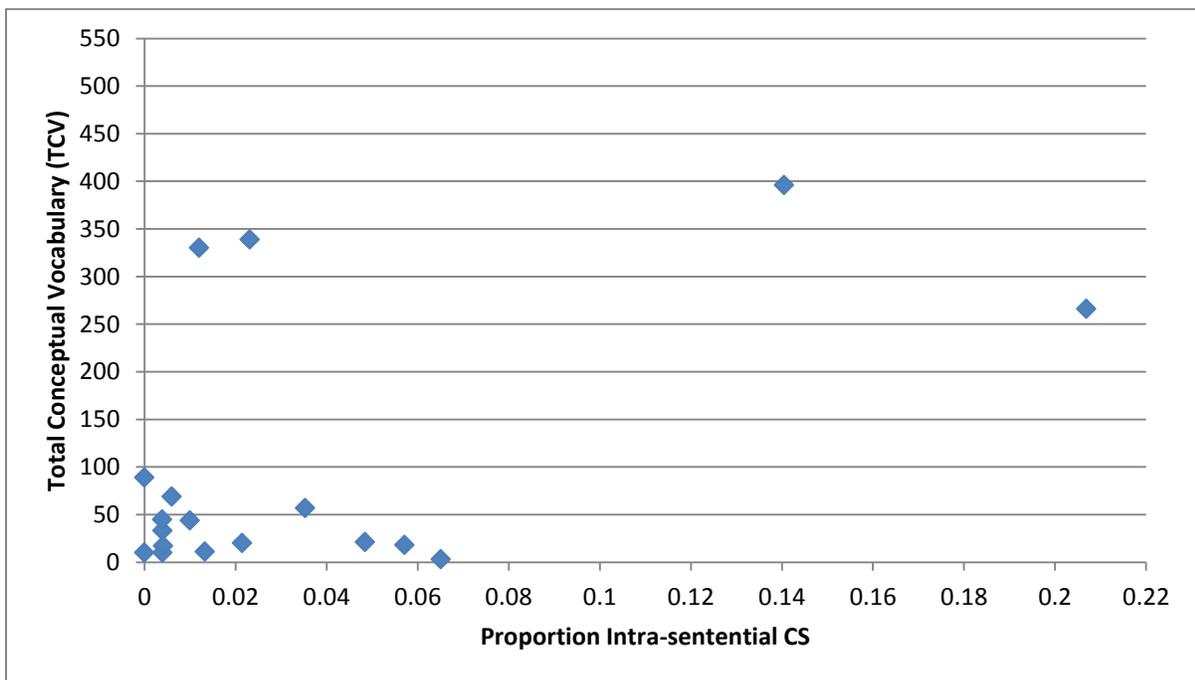


Figure 8. Stepwise Regression for Total Vocabulary (TV) Minus Cognates with Intra-sentential CS & Age as Predictor Variables

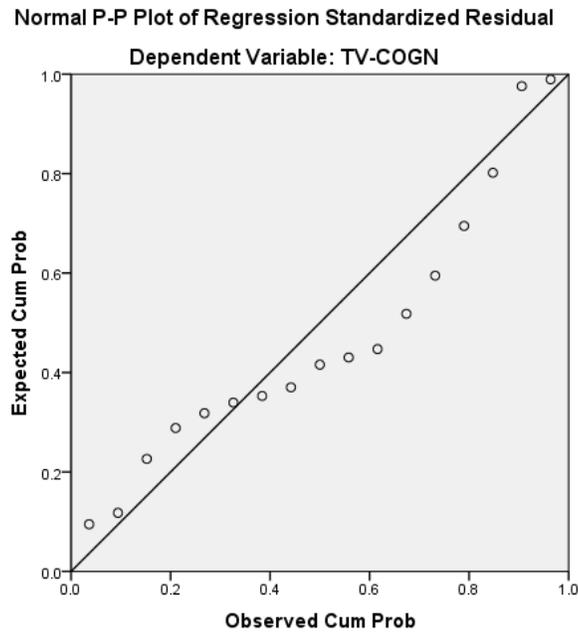


Figure 9. Stepwise Regression for Total Vocabulary (TV) with Intra-sentential CS & Age as Predictor Variables

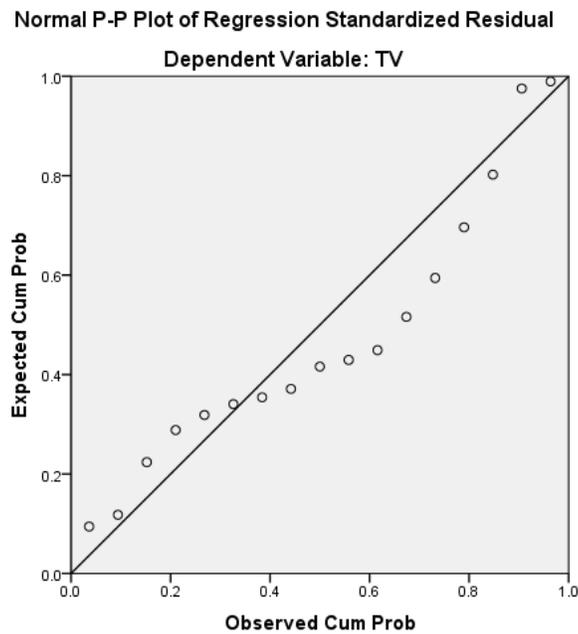


Figure 10. Stepwise Regression for Total Conceptual Vocabulary (TCV) Minus Cognates with Intra-sentential CS & Age as Predictor Variables

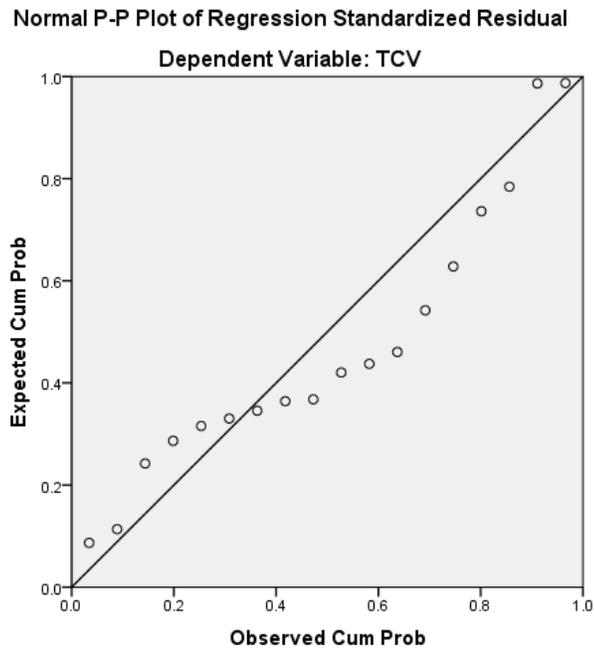


Figure 11. Correlation Between Intra-sentential CS and Translation Equivalents (TEs)

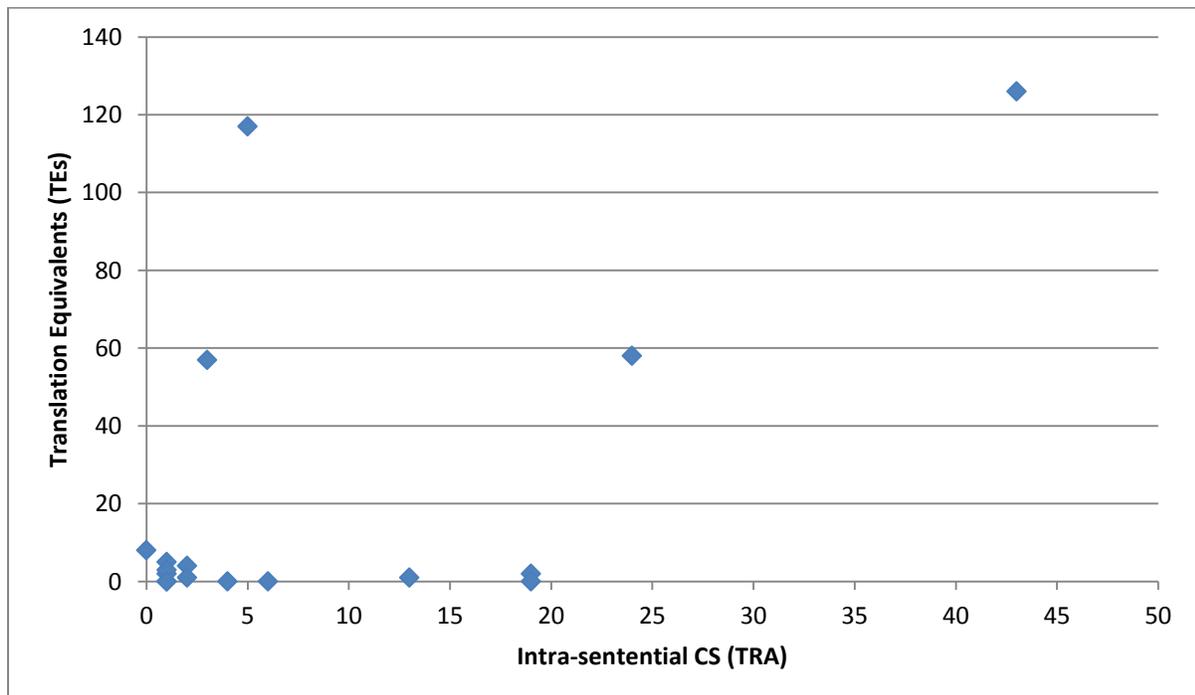
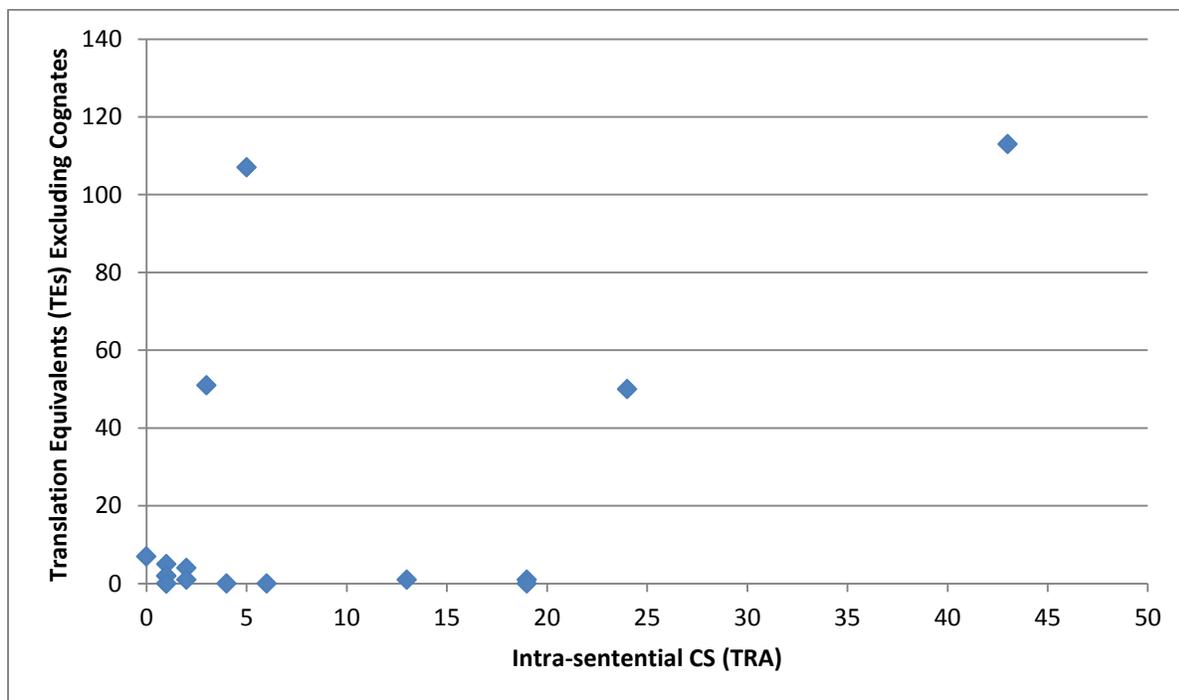


Figure 12. Correlation Between Intra-sentential CS and Translation Equivalents (TEs) Excluding Cognates



Appendix A. Language History Questionnaire

Language History Questionnaire  
*Historial de Aprendizaje de Idiomas*

Participant #: \_\_\_\_\_  
ID #: \_\_\_\_\_

Your child's full name/*Nombre de su hijo(a)*: \_\_\_\_\_

Child's date of birth/*Fecha de nacimiento de su hijo(a)*- (DD/MM/YYYY): \_\_\_\_\_

Your name/*Su nombre*: \_\_\_\_\_

Relationship to child/*Relación con el/la niño(a)*: \_\_\_\_\_

Today's Date/*Fecha de hoy*: \_\_\_\_\_

Was your child born before 36 weeks? *¿Nació su hijo(a) antes de 36 semanas?*

No/*No*     Yes/*Si*:    Gestations/*Gestación* \_\_\_\_\_    Weight/*Peso* \_\_\_\_\_

**Please answer the following questions as accurately as possible:**

*(Por favor conteste las siguientes preguntas):*

**ABOUT PARENTS/CAREGIVERS** *Sobre los Padres/Adultos que pasa mucho tiempo con el/la niño(a)*

**1. What is the parent's country of origin?** *¿Cuál es el país de origen de los padres?*

Mom (*Madre*): \_\_\_\_\_ Dad (*Padre*): \_\_\_\_\_

Caregiver (*Otro adulto que pasa mucho tiempo con el/la niño(a)*): \_\_\_\_\_

**2. At what age did parents become bilingual?** *¿A qué edad se volvieron bilingües los padres?*

Mom (*Madre*): \_\_\_\_\_ Dad (*Padre*): \_\_\_\_\_

Caregiver (*Otro adulto que pasa mucho tiempo con el/la niño(a)*): \_\_\_\_\_

**3. At what age did parents start learning Spanish?** *¿A qué edad empezaron a aprender español los padres?*

Mom (*Madre*): \_\_\_\_\_ Dad (*Padre*): \_\_\_\_\_

Caregiver (*Otro adulto que pasa mucho tiempo con el/la niño(a)*): \_\_\_\_\_

**4. How many years have parents lived in a Spanish-speaking country?** *¿Cuántos años vivieron los padres en un país de habla hispana?*

Mom (*Madre*): \_\_\_\_\_ Dad (*Padre*): \_\_\_\_\_

Caregiver (*Otro adulto que pasa mucho tiempo con el/la niño(a)*): \_\_\_\_\_

**5. At what age did parents begin living in a Spanish-speaking country?** *¿A qué edad empezaron los padres a vivir en un país de habla hispana?*

Mom (*Madre*): \_\_\_\_\_ Dad (*Padre*): \_\_\_\_\_

Caregiver (*Otro adulto que pasa mucho tiempo con el/la niño(a)*): \_\_\_\_\_

**6. How did parents/caregiver learn Spanish? (check all that apply)**

*¿Cómo aprendieron español los padres? (marque todas las casillas que sean pertinentes)*

	<b>Home</b> <i>(En casa)</i>	<b>School</b> <i>(En la escuela)</i>	<b>Other: _____</b> <i>(Otra)</i>
<b>Mom (Madre)</b>			
<b>Dad (Padre)</b>			
<b>Caregiver (Otro adulto)</b>			

**7. At what age did parents start learning English? ¿A qué edad empezaron a aprender inglés los padres?**

Mom (Madre): \_\_\_\_\_ Dad (Padre): \_\_\_\_\_

Caregiver (Otro adulto que pasa mucho tiempo con el/la niño(a)): \_\_\_\_\_

**8. How many years have parents lived in an English-speaking country? ¿Cuántos años vivieron los padres en un país de habla inglesa?**

Mom (Madre): \_\_\_\_\_ Dad (Padre): \_\_\_\_\_

Caregiver (Otro adulto que pasa mucho tiempo con el/la niño(a)): \_\_\_\_\_

**9. At what age did parents begin living in an English-speaking country?**

*¿A qué edad empezaron los padres a vivir en un país de habla inglesa?*

Mom (Madre): \_\_\_\_\_ Dad (Padre): \_\_\_\_\_

Caregiver (Otro adulto que pasa mucho tiempo con el/la niño(a)): \_\_\_\_\_

**10. How did parents learn English? (check all that apply)**

*¿Cómo aprendieron inglés los padres? (marque todas las casillas que sean pertinentes)*

	<b>Home</b> <i>(En casa)</i>	<b>School</b> <i>(En la escuela)</i>	<b>Other: _____</b> <i>(Otra)</i>
<b>Mom (Madre)</b>			
<b>Dad (Padre)</b>			
<b>Caregiver (Otro adulto)</b>			

**Please answer each of the following questions, checking the appropriate number:**

*Por favor conteste las siguientes preguntas, marcando la casilla con el número que sea apropiado:*

**11. Estimate parents'/caregiver's daily use of speaking Spanish, in hours**

*Estime el número de horas diarias en que los padres u otro adulto hablan español*

	0 hrs	1 hrs	2 hrs	3 hrs	4 hrs	5 hrs	6 hrs	7 hrs	8 hrs	9 hrs	10 hrs +
<b>Mom (Madre)</b>											

Dad (Padre)												
Caregiver (Otro adulto)												

**12. Estimate parents'/caregiver's daily use of speaking English, in hours**

*Estime el número de horas diarias en que los padres u otro adulto hablan inglés*

	0 hrs	1 hrs	2 hrs	3 hrs	4 hrs	5 hrs	6 hrs	7 hrs	8 hrs	9 hrs	10 hrs +
Mom (Madre)											
Dad (Padre)											
Caregiver (Otro adulto)											

**13. Rate parents'/caregiver's proficiency level in Spanish and English**

*Estime el nivel de habilidad de los padres u otro adulto al hablar español e inglés*

	1 Little to no knowledge <i>Poco o ningún conocimiento</i>		2		3		4		5		6		7 Like a native speaker <i>Como un nativo</i>	
	Span. <i>Españ</i>	Eng. <i>Inglés</i>	Span. <i>Españ</i>	Eng. <i>Inglés</i>	Span. <i>Españ</i>	Eng. <i>Inglés</i>	Span. <i>Españ</i>	Eng. <i>Inglés</i>	Span. <i>Españ</i>	Eng. <i>Inglés</i>	Span. <i>Españ</i>	Eng. <i>Inglés</i>	Span. <i>Españ</i>	Eng. <i>Inglés</i>
Mom <i>Madre</i>														
Dad <i>Padre</i>														
Caregiver <i>Otro Adulto</i>														

**ABOUT THE CHILD *Sobre el/la niño(a)***

**14. If child was not born in the US, years of residence in the United States? \_\_\_\_\_**

*(¿Si el/la niño(a) no nació en EE.UU, cuántos años ha vivido en este país?)*

**15. Does the child speak any other languages besides Spanish and English? \_\_\_\_\_**

*(¿Su hijo(a) habla algún otro idioma además de español e inglés?)*

**16. At what age did the child start learning Spanish? \_\_\_\_\_**

*(¿A qué edad empezó a aprender español su hijo(a)?)*

**17. How did he/she learn Spanish? (check all that apply)**

*(¿Cómo aprendió español su hijo(a)? – marque todas las respuestas que sean pertinentes)*

Home (*en casa*) \_\_\_\_\_ Daycare (*en la guardería*) \_\_\_\_\_ Other (*otra*): \_\_\_\_\_

**18. At what age did the child start learning English? \_\_\_\_\_**

*(¿A qué edad empezó a aprender inglés su hijo(a)?)*

**19. How did he/she learn English? (check all that apply)**

(¿Cómo aprendió inglés su hijo(a)? – marque todas las respuestas que sean pertinentes)

Home (en casa) \_\_\_\_\_ Daycare (en la guardería) \_\_\_\_\_ Other (otra): \_\_\_\_\_

**20. Estimate the child's language abilities in Spanish and in English: Please check all that apply**

Estime la habilidad del lenguaje del niño(a) al hablar español e inglés: Marque todas las casillas que sean pertinentes

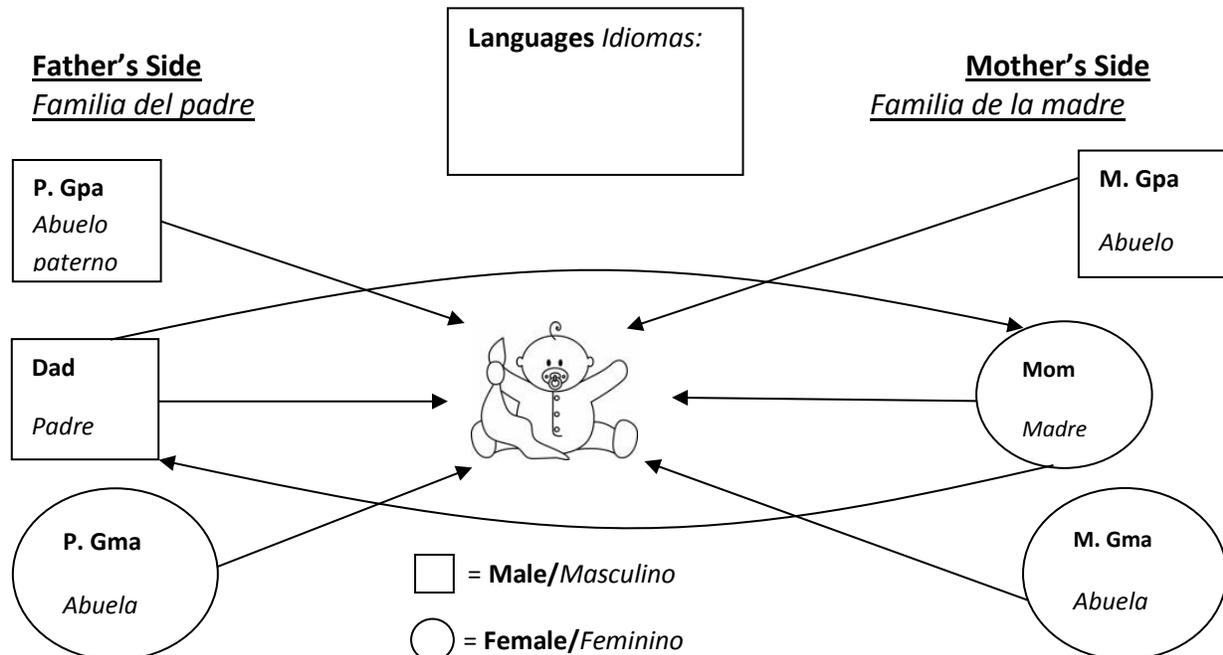
	<u>Spanish (Español)</u>							<u>English (Inglés)</u>						
	1 = poor excellent (deficiente) (excelente)							1 = poor excellent (deficiente) (excelente)						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
<b>Understands when others speak</b> <i>Entiende cuando otros hablan</i>														
<b>Speaks</b> <i>Habla</i>														

**Language Environment: PART 1**

**Ambiente del lenguaje: Parte 1**

- a) On each arrow, write the languages that you, your spouse and your parents use when speaking to your child. If more than 1 language is used by a person, separate the languages with a comma. Also write the language(s) used when you and your spouse speak to each other.

Encima de las flechas escriba cada idioma que usted, su pareja, y sus padres usan cuando hablan con su hijo(a). Si una persona usa más de un idioma separe los idiomas con una coma. También escriba encima de las flechas los idiomas que usted y su pareja usan cuando hablan entre el uno al otro.



**b) Who spends time with the child and what languages do they speak (exposure to monolingual or to bilingual adults)? If there are other people in your child’s life not mentioned in part 1, you should mention them here.**

*¿Quienes pasan tiempo con el/la niño(a) y qué idiomas hablan (está expuesto a adultos monolingües o bilingües)? Si hay más personas que pasan tiempo con el/la niño(a), que no se hayan mencionado en la primera parte, puede añadir las aquí.*

<b>Person</b> <i>Persona</i>	<b>Primary Language</b> <i>Idioma Primario</i>	<b>Secondary Language</b> <i>Idioma Secundario</i>	<b>Notes</b> <i>Notas</i>

**c) Think about a normal day in your child’s life from when he/she wakes up, who he/she is with and what he/she is doing. Estimate the number of hours a day your child hears the various languages from sections a) and b). Include caretakers/friends of the child who spend 1 hour a week or more on a regular basis talking to the child (parents, grandparents, aunts, uncles, siblings, playmates, daycare, nanny). TV/Radio NOT included.**

*Piense en un día normal de su hijo(a) desde la hora que se despierta, con quien está, y que hace. Estime cuantas horas cada día su hijo(a) oye los varios idiomas de las secciones a) y b). Incluya amigos/personas que cuidan al/a niño(a) que están con el/la niño(a) por una hora o más de una hora a la semana hablando con él/ella con regularidad (padres, abuelos, tías, tíos, hermanos, amigos, guardería, niñera). La televisión/la radio no deben ser incluidos.*

Example: This would be how the record of an 18 month old child learning English and Spanish looks like. Mom stayed at home the first year, dad works 5 days a week, and the baby entered a primarily English-speaking childcare at 12 months.

Ejemplo: Esto muestra como podría ser la historia de un niño que tiene 18 meses que aprende inglés y español. La madre se quedó en casa con su hijo el primer año, el padre trabajó 5 días a semana, y cuando el niño tenía 12 meses empezó a asistir a una guardería donde se hablaba inglés principalmente.



## PART 2

**a) In what situations do you tend to speak in Spanish with your child? (check all that apply):**

*¿En qué situaciones suele hablar español con su hijo(a)? (marque todas las respuestas que sean pertinentes):*

- When one on one/*Cuando estamos solos*
- At home/*En casa*
- With friends/*Con amigos*
- With family/*Con familia*
- At playgroup or lessons/*En grupos de juego o clases*
- When out (shopping, etc.)/*Cuando estamos afuera de la casa (estando de compras)*
- Other (please specify)/*Otro (favor de especificar)*\_\_\_\_\_

**b) In what situations do you tend to speak in English with your child? (check all that apply):**

*¿En qué situaciones suele hablar inglés con su hijo(a)? (marque todas las respuestas que sean pertinentes):*

- When one on one/*Cuando estamos solos*
- At home/*En casa*
- With friends/*Con amigos*
- With family/*Con familia*
- At playgroup or lessons/*En grupos de juego o clases*
- When out (shopping, etc.)/*Cuando estamos afuera de la casa (estando de compras)*
- Other (please specify)/*Otro (favor de especificar)*\_\_\_\_\_

**c) If you use a third language, in what situations do you tend to speak in**

**(please specify the language) \_\_\_\_\_ with your child? (check all that apply):**

*Si usted habla un tercer idioma con su hijo(a) ¿en qué situaciones lo suele hablar, \_\_\_\_\_ (favor de especificar el lenguaje)? (marque todas las respuestas que sean pertinentes):*

- When one on one/*Cuando estamos solos*
- At home/*En casa*
- With friends/*Con amigos*
- With family/*Con familia*
- At playgroup or lessons/*En grupos de juego o clases*
- When out (shopping, etc.)/*Cuando estamos afuera de la casa (estando de compras)*
- Other (please specify)/*Otro (favor de especificar)*\_\_\_\_\_

**d) What percentage of your interactions with your child are**

*¿Qué porcentaje de sus interacciones con su hijo(a) son*

in English? *en inglés?* \_\_\_\_\_ %

in Spanish? *en español?* \_\_\_\_\_ %

in other languages? *en otro idioma?* \_\_\_\_\_ (language/*que idioma*) \_\_\_\_\_ % (of the time/  
*que porcentaje del tiempo*)

**Please answer the following questions, considering how you speak when interacting with your child. You should respond in accordance to the language you use most with your child. Please circle a number to indicate how much you agree with each statement.**

*Por favor conteste las siguientes preguntas considerando como usted habla y se relaciona con su hijo(a). Usted debe responder de acuerdo con el idioma que usa más con su hijo(a). Por favor circule el número que indica que tan de acuerdo está con cada declaración o frase.*

**e) I often start a sentence in English and then switch to speaking Spanish.**

*Frecuentemente empiezo una frase u oración en inglés y cambio a español.*

1	2	3	4	5	6	7
Very true		Somewhat true			Not at all true	
<i>Muy cierto</i>		<i>Algo cierto</i>			<i>Para nada cierto</i>	

**f) I often start a sentence in Spanish and then switch to speaking English.**

*Frecuentemente empiezo una frase u oración en inglés y cambio a español.*

1	2	3	4	5	6	7
Very true		Somewhat true			Not at all true	
<i>Muy cierto</i>		<i>Algo cierto</i>			<i>Para nada cierto</i>	

**g) I often borrow a Spanish word when speaking English.**

*Frecuentemente cuando estoy hablando en inglés uso o asimilo una palabra en español.*

1	2	3	4	5	6	7
Very true		Somewhat true			Not at all true	
<i>Muy cierto</i>		<i>Algo cierto</i>			<i>Para nada cierto</i>	

**I do this in situations when (check all that apply):**

*Hago esto en situaciones cuando (marque todas las respuestas que sean pertinentes):*

- I'm not sure of the English word/*No estoy seguro(a) de la palabra en inglés*
- No translation or only a poor translation exists for the word/*No hay una traducción de la palabra o sólo existe una que no es buena*
- The English word is hard to pronounce/*La palabra en inglés es difícil de pronunciar*
- When I'm teaching new words/*Cuando estoy enseñándole nuevas palabras*
- Other times or Not sure/*Otras veces o No estoy seguro(a)*

**h) I often borrow an English word when speaking Spanish.**

*Frecuentemente cuando estoy hablando en español uso o asimilo una palabra en inglés.*

- |                   |   |                    |   |   |                         |   |
|-------------------|---|--------------------|---|---|-------------------------|---|
| 1                 | 2 | 3                  | 4 | 5 | 6                       | 7 |
| Very true         |   | Somewhat true      |   |   | Not at all true         |   |
| <i>Muy cierto</i> |   | <i>Algo cierto</i> |   |   | <i>Para nada cierto</i> |   |

**I do this in situations when (check all that apply):**

*Lo hago en situaciones cuando (marque todas las respuestas que sean pertinentes):*

- I'm not sure of the Spanish word/*No estoy seguro(a) de la palabra en español*
- No translation or only a poor translation exists for the word/*No hay una traducción de la palabra o sólo existe una que no es buena*
- The Spanish word is hard to pronounce/*La palabra en español es difícil de pronunciar*
- When I'm teaching new words/*Cuando estoy enseñándole nuevas palabras*
- Other times or not sure/*Otras veces o No estoy seguro(a)*

**i) In general, I often mix English and Spanish.**

*En general cuando hablo mezclo inglés y español con frecuencia.*

- |                   |   |                    |   |   |                         |   |
|-------------------|---|--------------------|---|---|-------------------------|---|
| 1                 | 2 | 3                  | 4 | 5 | 6                       | 7 |
| Very true         |   | Somewhat true      |   |   | Not at all true         |   |
| <i>Muy cierto</i> |   | <i>Algo cierto</i> |   |   | <i>Para nada cierto</i> |   |

## References

- Abutalebi, J., Brambati, S. M., Annoni, J. M., Moro, A., Cappa, S. F., & Perani, D. (2007). The neural cost of the auditory perception of language switches: an event-related functional magnetic resonance imaging study in bilinguals. *The Journal of Neuroscience*, *27*(50), 13762-13769.
- Barron-Hauwaert, S. (2004). *Language strategies for bilingual families: The one-parent-one-language approach*. Clevedon, UK: Multilingual Matters.
- Bosch, L., & Sebastian-Galles, N. (1997). Native-language recognition abilities in 4-month-old infants from monolingual and bilingual environments. *Cognition*, *65*(1), 33–69.
- Boumans, L. (1998). *The syntax of codeswitching: Analysing Moroccan Arabic/Dutch conversation*. (Doctoral dissertation). Tilburg: Tilburg University Press.
- Bullock, B. E., & Toribio, A. J. (2009). *The Cambridge handbook of linguistic code-switching*. New York, NY: Cambridge University Press.
- Byers-Heinlein, K. (2009). *Characterizing bilingual input: A self-report measure of language mixing by bilingual parents*. Poster presented at the Boston University Conference on Child Language Development, Boston.
- Byers-Heinlein, K. (in press, 2012). Parental language mixing: its measurement and the relation of mixed input to young bilingual children's vocabulary size. *Bilingualism: Language and Cognition*.
- Cantone, K. F. (2007). *Code-switching in bilingual children*. Dordrecht: Springer.

- Chauncey, K., Grainger, J., & Holcomb, P.J. (2008). Code-switching effects in bilingual word recognition: A masked priming study with event-related potentials. *Brain and Language, 105*, 161-174.
- Clark, E. (1987). The principle of contrast: a constraint on language acquisition. In B. MacWhinney (Ed.), *Mechanisms of Language Acquisition* (pp. 1-33). Hillsdale, NJ: Erlbaum.
- Clark, E. (2003). *First language acquisition*. Cambridge, UK: Cambridge University Press.
- David, A., & Wei, L. (2008). Individual differences in the lexical development of French-English bilingual children. *International Journal of Bilingual Education and Bilingualism, 11*(5), 598-618.
- Deuchar, M., & Quay, S. (2000). *Bilingual acquisition: Theoretical implications of a case study*. Oxford: Oxford University Press.
- Duñabeitia, J.A., Dimitropoulou, M., Uribe-Etxebarria, O., Laka, I., & Carreiras, M. (2010). Electrophysiological correlates of the masked translation priming effect with highly proficient simultaneous bilinguals. *Brain Research, 1359*, 142–154.
- Fantini, A. E. (1985). *Language acquisition of a bilingual child: A sociolinguistic perspective (to age ten)*. San Diego, CA: College Hill Press.
- Fennell, C.T., Byers-Heinlein, K., & Werker, J.F. (2007). Using speech sounds to guide word learning: The case of bilingual infants. *Child Development, 78*, 1510-1525.

- Fennell, C.T., & Byers-Heinlein, K. (2011, June). Sentential cues to a word's language boost bilingual and monolingual infants' learning of minimal pairs. *Poster presented at the 8th International Symposium on Bilingualism*. Oslo, Norway.
- Fenson, L., Dale, P. S., Reznick, J.S., Thal, D., Bates, E., Hartung, J. P., Pethick, S., & Reilly, J. S. (1991). *Technical manual for the MacArthur Communicative Development Inventories*. San Diego, CA: San Diego State University.
- Fernald, A. (1992). Meaningful melodies in mothers' speech to infants. In H. Papousek, U. Jurgens & M. Papousek (Eds.), *Nonverbal vocal communication: Comparative and developmental approaches* (pp. 262-282). Cambridge, UK: Cambridge University Press.
- Fleiss, J.L. (1981). *Statistical methods for rates and proportions* (2nd ed.). New York: John Wiley.
- Genesee, F. (2008). Early dual language learning. *Zero to Three*, 29(1), 17-23
- Genesee, F., Nicoladis, E., & Paradis, J. (1995). Language differentiation in early bilingual development. *Journal of Child Language*, 22(3), 611-631.
- Gleason, J. B. (1977). Talking to children: Some notes on feedback. In C. Snow & C. Ferguson (Eds.), *Talking to children: Language input and acquisition* (pp. 199-205). Cambridge, UK: Cambridge University Press.
- Gleitman, L.R., Newport, E.L., & Gleitman, H. (1984). The current status of the Motherese hypothesis. *Journal of Child Language*, 11, 43-79.
- Goodman, J. C., Dale, P. S., & Li, P. (2008). Does frequency count? Parental input and the acquisition of vocabulary. *Journal of Child Language*, 35, 515-531.

- Grosjean, F. (1995). A psycholinguistic approach to code-switching: The recognition of guest words by bilinguals. In L. Milroy and P. Muysken (Eds.), *One speaker, two languages: Cross-disciplinary perspectives on code-switching* (pp. 259-275). Cambridge, UK: Cambridge University Press.
- Grosjean, F. (2001). The bilingual's language modes. In J. Nicol (Ed.), *One mind, two languages: Bilingual language processing* (pp. 1-22). Malden, MA: Blackwell.
- Hart, B., & Risley, T.R. (1995). *Meaningful differences in the everyday experience of young American children*. Baltimore, MD: Paul Brookes Publishing.
- Hoff, E. (2003). The specificity of environmental influence: Socioeconomic status affects early vocabulary development via maternal speech. *Child development, 74*(5), 1368-1378.
- Hoff, E. (2006). How social contexts support and shape language development. *Developmental Review, 26*, 55-88.
- Hoff, E., & Naigles, L. (2002). How children use input to acquire a lexicon. *Child Development, 73*, 418-433.
- Hurtado, N., Virginia, M. A., & Fernald, A. (2007). Spoken word recognition by Latino children learning Spanish as their first language. *Journal of Child Language, 33*, 227-249.
- Huttenlocher, J., Haight, W., Bryk, A., Seltzer, M., & Lyons, T. (1991). Early vocabulary growth: Relation to language input and gender. *Developmental Psychology, 27*, 236-48.
- Isurin, L., Winford, D., & de Bot, K. (2009). *Multidisciplinary approaches to code switching*. Amsterdam: John Benjamins Publishing Company.

Jackson-Maldonado, D., Thal, D.J., Marchman, V. A., Newton, T., Fenson, L., & Conboy, B. (2003). *MacArthur-Bates Inventarios del Desarrollo de Habilidades Comunicativas: User's guide and technical manual*. Baltimore, MD: Brookes Publishing Company.

Jake, J. L., Myers-Scotton, C., & Gross, S. (2002). Making a minimalist approach to codeswitching work: Adding the matrix language. *Bilingualism: Language and Cognition*, 5(1), 69-91.

Koppe, R., & Meisel, J. M. (1995). Code-switching in bilingual first language acquisition. In L. Milroy & P. Muysken (Eds.), *One speaker, two languages: Cross-disciplinary perspectives on code-switching* (pp. 276-301). Cambridge, UK: Cambridge University Press.

Landis, J.R.; & Koch, G.G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, 33(1),159–174.

Lanza, E. (1988). Language strategies in the home: Linguistic input and infant bilingualism. In A. Homen, E. Hansen, J. Gimbel, & J. Jorgensen (Eds.), *Bilingualism and the individual* (pp. 69-84). Clevedon, UK: Multilingual Matters.

MacWhinney, B. (2000). *The CHILDES Project: Tools for Analyzing Talk* (3<sup>rd</sup> ed.) Vol 2: The Database. Mahwah, NJ: Lawrence Erlbaum Associates.

MacWhinney, B. (2007). *The CHILDES project: Tools for analyzing talk – electronic edition*. Part 1: The CHAT transcription format. Mahwah, NJ: Lawrence Erlbaum Associates.

Meisel, J. M. (1994). Code-switching in young bilingual children: The acquisition of grammatical constraints. *Studies in Second Language Acquisition*, 16(4), 413-439.

- Meisel, J. M. (2004). The bilingual child. In T. Bathia & W. Ritchie (Eds.), *The Handbook of Bilingualism* (pp. 91-113). Oxford: Blackwell.
- Meuter, R. F. I. (2009). Language selection and performance optimisation in multilinguals. In L. Isurin, D. Winford & K. de Bot (Eds.), *Multidisciplinary approaches to code switching* (pp. 27-51). Amsterdam: John Benjamins Publishing Company.
- Milroy, L., & Muysken, P. (1995). *One speaker, two languages: Cross-disciplinary perspectives on code-switching*. Cambridge, UK: Cambridge University Press.
- Moreno E. M., Rodriguez-Fornells A., Laine M. (2008). Event-related potentials (ERPs) in the study of bilingual language processing. *Journal of Neurolinguistics*, 21, 477–508.
- Muysken, P. (2000). *Bilingual speech: A typology of code-mixing*. Cambridge, UK: Cambridge University Press.
- Myers-Scotton, C. (1993). *Duelling Languages: Grammatical structure in codeswitching*. Oxford and New York: Oxford University Press.
- Myers-Scotton, C. (1997). *Duelling Languages: Grammatical structure in codeswitching* (2<sup>nd</sup> ed. with added afterword). Oxford: Oxford University Press.
- Pearson, B. Z. (1998). Assessing lexical development in bilingual babies and toddlers. *International Journal of Bilingualism*, 2, 347-372.
- Pearson, B. Z., Fernandez, S., & Oller, D. K. (1993). Lexical development in bilingual infants and toddlers: Comparison to monolingual norms. *Language Learning*, 43, 93-120.

- Pearson, B. Z., & Fernandez, S. (1994). Patterns of interaction in the lexical development in two languages of bilingual infants. *Language Learning*, 44, 617-653.
- Pearson, B.Z., Fernandez, S.C., Lewedeg, V., & Oller, D.K. (1997). The relation of input factors to lexical learning by bilingual infants. *Applied Psycholinguistics*, 18, 41-58.
- Place, S. & Hoff, E. (2011). Properties of dual language exposure that influence two-year-olds' bilingual proficiency. *Child Development*, 82(6), 1834-1849.
- Poplack, S. (1980). Sometimes I'll start a sentence in Spanish Y TERMINO EN ESPANOL: Toward a typology of code-switching. *Linguistics*, 18(7-8), 581-618.
- Poplack, S. (1981). The syntactic structure and social function of code-switching. In R. Duran (Ed.), *Latino language and communicative behavior* (pp. 169-184). Norwood, NJ: Ablex.
- Poplack, S., Sankoff, D. & Miller, C. (1988). The social correlates and linguistic processes of lexical borrowing and assimilation. *Linguistics*, 26, 47-104.
- Proverbio A.M., Leoni, G., & Zani A. (2004). Language switching mechanisms in simultaneous interpreters: an ERP study. *Neuropsychologia*, 42(12), 1636-1656.
- Schwartz, R., & Terrell, B. (1983). The role of input frequency in lexical acquisition. *Journal of Child Language*, 10, 57-66.
- Snow, C. (1994). Beginning from baby talk: Twenty years of research on input and interaction. In C. Galloway & B. Richards (Eds.), *Input and interaction in language acquisition* (pp. 3-12). London: Cambridge University Press.

Soto, R. A. (2009, July 7). OPOL Week: Why this is the way to go if you're raising a bilingual child. [Web log post]. Retrieved from <http://spanglishbaby.com/2009/07/opol-week-why-this-is-the-way-to-go-if-youre-raising-a-bilingual-child>

Steiner, N., & Hayes, S. L. (2008). *7 Steps to raising a bilingual child*. New York, NY: AMACOM.

Volterra, V., & Taeschner, T. (1978). The acquisition and development of language by bilingual children. *Journal of Child Language*, 5, 311-326.

Vosoughi, S., Roy, B., Frank, M., & Roy, D. (2010). Contributions of prosodic and distributional features of caregivers' speech in early word learning. *Proceedings of the 32<sup>nd</sup> Annual Cognitive Science Conference*. Portland, OR.

Weizman, Z.O., & Snow, C.E. (2001). Lexical input as related to children's vocabulary acquisition: Effects of sophisticated exposure and support for meaning. *Developmental Psychology*, 37, 265-279.